***g=***1***, FAC=1***

***B***= ***UU*** ***=D=U******=***[2,3,9,11,12,15,19,22,26,27,28,29,35,36,38,39,42,43,44,45,49,52,54,55,56]

***FACU***={1,2,3,4,5,7,9,25,29,31,44}

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***DEM(m), maxH (U)=DEM(U) and max(***$\overbar{U}$***)=0*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 751 | 742 | 741 | 744 | 750 | NaN |
| 763 | 750 | 741 | 741 | 741 | 743 | 748 | 750 |
| NaN | 745 | 741 | 736 | 739 | 744 | 744 | 740 |
| NaN | 747 | 747 | 745 | 735 | 735 | 736 | 744 |
| NaN | NaN | NaN | 746 | 737 | 732 | 728 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B=U*** | ***BM*** | ***N1=N2=N3=N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 15 | 22 | 29 | 36 | 43 | NaN |
| 2 | 9 | NaN | NaN | NaN | NaN | 44 | NaN |
| 3 | NaN | NaN | NaN | NaN | 38 | 45 | 52 |
| NaN | 11 | NaN | NaN | NaN | 39 | NaN | NaN |
| NaN | 12 | 19 | 26 | NaN | NaN | NaN | 54 |
| NaN | NaN | NaN | 27 | NaN | NaN | NaN | 55 |
| NaN | NaN | NaN | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

In the first iteration, ***g=1***, ***U*** contains indices of all high ends where ***FAC=1*** as in blue background. ***B*** is initilized by ***U*** because every high end is an independent basin having only 1 cell which is absolultely a boundary cell. At cells in ***U***, ***BM*** is initialized by the 1d-index while at cells not in ***U***, the ***BM*** value is No Data because these downstream basins have not been computed yet. The facing directions of ***N1 -N4***  are right, bottom, left and top respectively. All ***N1***- ***N4*** has a true value at cells in ***U*** and a flase value elsewhhere because all single boundary cells face outwardly to all four directions.

***g***=2, ***FAC***=2, before boundary update due to merging tributaries.

***U***=[ 2, 3, 9,11,12,15,19,22,26,27,28,29,35,36,38,39,42,43,44,45,49,52,54,55,56]

***D***=[ 2, 3, 9,11,12,16,19,23,26,27,34,30,35,36,38,39,42,43,44,46,49,53,54,55,56]

***B***=[ 2, 3, 9,11,12,15,19,22,26,27,28,29,35,36,38,39,42,43,44,45,49,52,54,55,56]

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 0 | 750 | NaN |
| 763 | 0 | 0 | 0 | 0 | 743 | 748 | 750 |
| NaN | 745 | 0 | 0 | 0 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 0 | 0 | 0 | 744 |
| NaN | NaN | NaN | 746 | 748 | 0 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM***  | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 16 | 23 | 30 | 36 | 43 | NaN |
| 2 | 9 | 16 | 23 | 30 | NaN | 44 | NaN |
| 3 | NaN | NaN | NaN | NaN | 38 | 46 | 53 |
| NaN | 11 | NaN | NaN | NaN | 39 | 46 | 53 |
| NaN | 12 | 19 | 26 | NaN | NaN | NaN | 54 |
| NaN | NaN | NaN | 27 | 34 | NaN | NaN | 55 |
| NaN | NaN | NaN | 34 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

***g***=2, ***FAC***=2,after boundary update due to merging tributaries.

***D***=[16,23,30,34,46,53,16,23,34,30,46,53, 2, 3, 9,11,12,19,26,27,35,36,38,39,42,43,44,49,54,55,56]

***B***=[16,23,30,34,46,53,15,22,28,29,45,52, 2, 3, 9,11,12,19,26,27,35,36,38,39,42,43,44,49,54,55,56]

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 0 | 750 | NaN |
| 763 | 0 | 0 | 0 | 0 | 743 | 748 | 750 |
| NaN | 745 | 0 | 0 | 0 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 0 | 0 | 0 | 744 |
| NaN | NaN | NaN | 746 | 748 | 0 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM***  | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 16 | 23 | 30 | 36 | 43 | NaN |
| 2 | 9 | 16 | 23 | 30 | NaN | 44 | NaN |
| 3 | NaN | NaN | NaN | NaN | 38 | 46 | 53 |
| NaN | 11 | NaN | NaN | NaN | 39 | 46 | 53 |
| NaN | 12 | 19 | 26 | NaN | NaN | NaN | 54 |
| NaN | NaN | NaN | 27 | 34 | NaN | NaN | 55 |
| NaN | NaN | NaN | 34 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

***g***=3***, FAC***=3

***U***=[16,23,30,34,46,53,16,23,34,30,46,53, 2, 3, 9,11,12,19,26,27,35,36,38,39,42,43,44,49,54,55,56]

***D***=[16,23,24,34,46,47,16,23,34,24,46,47,10,10, 9,11,12,19,26,27,35,36,38,39,42,43,44,49,54,55,56]

***B***=[16,23,30,34,46,53,15,22,28,29,45,52, 2, 3, 9,11,12,19,26,27,35,36,38,39,42,43,44,49,54,55,56]

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 0 | 750 | NaN |
| 763 | 768 | 0 | 752 | 0 | 743 | 748 | 750 |
| NaN | 745 | 0 | 0 | 0 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 0 | 0 | 750 | 744 |
| NaN | NaN | NaN | 746 | 748 | 0 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM*** | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 16 | 23 | 24 | 36 | 43 | NaN |
| 10 | 9 | 16 | 23 | 24 | NaN | 44 | NaN |
| 10 | 10 | NaN | 24 | NaN | 38 | 46 | 47 |
| NaN | 11 | NaN | NaN | NaN | 39 | 46 | 47 |
| NaN | 12 | 19 | 26 | NaN | NaN | 47 | 54 |
| NaN | NaN | NaN | 27 | 34 | NaN | NaN | 55 |
| NaN | NaN | NaN | 34 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

 ***g***=3***, FAC***=3

 ***D***=[10,24,47,24,47,24,47,10,10,16,23,34,46,16,23,34,46, 9,11,12,19,26,27,35,36,38,39,42,43,44,49,54,55,56]

 ***B***=[10,24,47,30,53,29,52, 2, 3,16,23,34,46,15,22,28,45, 9,11,12,19,26,27,35,36,38,39,42,43,44,49,54,55,56]

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 0 | 750 | NaN |
| 763 | 768 | 0 | 752 | 0 | 743 | 748 | 750 |
| NaN | 745 | 0 | 0 | 0 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 0 | 0 | 750 | 744 |
| NaN | NaN | NaN | 746 | 748 | 0 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM*** (***U***)=***D, BM*** (***D***)=***D***  | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 16 | 23 | 24 | 36 | 43 | NaN |
| 10 | 9 | 16 | 23 | 24 | NaN | 44 | NaN |
| 10 | 10 | NaN | 24 | NaN | 38 | 46 | 47 |
| NaN | 11 | NaN | NaN | NaN | 39 | 46 | 47 |
| NaN | 12 | 19 | 26 | NaN | NaN | 47 | 54 |
| NaN | NaN | NaN | 27 | 34 | NaN | NaN | 55 |
| NaN | NaN | NaN | 34 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

***g***=4, ***FAC***=4

***U***=[10,24,47,24,47,24,47,10,10,16,23,34,46,16,23,34,46, 9,11,12,19,26,27,35,36,38,39,42,43,44,49,54,55,56]

***D***=[10,24,47,24,47,24,47,10,10,16,23,34,40,16,23,34,40, 9,18,18,18,26,27,35,37,38,40,42,37,37,49,54,55,56]

***B***=[10,24,47,30,53,29,52, 2, 3,16,23,34,46,15,22,28,45, 9,11,12,19,26,27,35,36,38,39,42,43,44,49,54,55,56]

***B***=[18,37,40,46,45,11,12,19,36,39,43,44,10,24,47,30,53,29,52, 2, 3,16,23,34,15,22,28, 9,26,27,35,38,42,49,54,55,5]

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 761 | 750 | NaN |
| 763 | 768 | 0 | 752 | 0 | 743 | 748 | 750 |
| NaN | 745 | 747 | 0 | 0 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 0 | 748 | 750 | 744 |
| NaN | NaN | NaN | 746 | 748 | 0 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM*** (***U***)=***D, BM*** (***D***)=***D***  | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 16 | 23 | 24 | 37 | 37 | NaN |
| 10 | 9 | 16 | 23 | 24 | 37 | 37 | NaN |
| 10 | 10 | NaN | 24 | NaN | 38 | 40 | 47 |
| NaN | 18 | 18 | NaN | NaN | 40 | 40 | 47 |
| NaN | 18 | 18 | 26 | NaN | 40 | 47 | 54 |
| NaN | NaN | NaN | 27 | 34 | NaN | NaN | 55 |
| NaN | NaN | NaN | 34 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

***g***=4, ***FAC***=4

***U***=[10,24,47,24,47,24,47,10,10,16,23,34,46,16,23,34,46, 9,11,12,19,26,27,35,36,38,39,42,43,44,49,54,55,56]

***D***=[18,37,40,40,40,18,18,18,37,40,37,37,10,24,47,24,47,24,47,10,10,16,23,34,16,23,34, 9,26,27,35,38,42,49,54,55,56]

***B***=[18,37,40,46,45,11,12,19,36,39,43,44,10,24,47,30,53,29,52, 2, 3,16,23,34,15,22,28, 9,26,27,35,38,42,49,54,55,5]

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 761 | 750 | NaN |
| 763 | 768 | 0 | 752 | 0 | 743 | 748 | 750 |
| NaN | 745 | 747 | 0 | 0 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 0 | 748 | 750 | 744 |
| NaN | NaN | NaN | 746 | 748 | 0 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM*** (***U***)=***D, BM*** (***D***)=***D***  | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 16 | 23 | 24 | 37 | 37 | NaN |
| 10 | 9 | 16 | 23 | 24 | 37 | 37 | NaN |
| 10 | 10 | NaN | 24 | NaN | 38 | 40 | 47 |
| NaN | 18 | 18 | NaN | NaN | 40 | 40 | 47 |
| NaN | 18 | 18 | 26 | NaN | 40 | 47 | 54 |
| NaN | NaN | NaN | 27 | 34 | NaN | NaN | 55 |
| NaN | NaN | NaN | 34 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

g=5, FAC=5

U=

D=

B=

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 |  | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 |  | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 |  | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 |  | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 |  | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 |  | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 |  | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 761 | 750 | NaN |
| 763 | 768 | 0 | 752 | 761 | 743 | 748 | 750 |
| NaN | 745 | 747 | 0 | 0 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 0 | 748 | 750 | 744 |
| NaN | NaN | NaN | 746 | 748 | 0 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM*** (***U***)=***D, BM*** (***D***)=***D***  | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 16 | 23 | 24 | 31 | 31 | NaN |
| 10 | 9 | 16 | 23 | 24 | 31 | 31 | NaN |
| 10 | 10 | NaN | 24 | 31 | 38 | 40 | 47 |
| NaN | 18 | 18 | NaN | NaN | 40 | 40 | 47 |
| NaN | 18 | 18 | 26 | NaN | 40 | 47 | 54 |
| NaN | NaN | NaN | 27 | 34 | NaN | NaN | 55 |
| NaN | NaN | NaN | 34 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

g=6, FAC=7

U=

D=

B=

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 761 | 750 | NaN |
| 763 | 768 | 0 | 752 | 761 | 743 | 748 | 750 |
| NaN | 745 | 747 | 0 | 761 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 0 | 748 | 750 | 744 |
| NaN | NaN | NaN | 746 | 748 | 0 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM*** | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 16 | 23 | 24 | 32 | 32 | NaN |
| 10 | 9 | 16 | 23 | 24 | 32 | 32 | NaN |
| 10 | 10 | NaN | 24 | 32 | 32 | 40 | 47 |
| NaN | 18 | 18 | NaN | 32 | 40 | 40 | 47 |
| NaN | 18 | 18 | 26 | NaN | 40 | 47 | 54 |
| NaN | NaN | NaN | 27 | 34 | NaN | NaN | 55 |
| NaN | NaN | NaN | 34 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

g=7, FAC=9

U=

D=

B=

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 761 | 750 | NaN |
| 763 | 768 | 768 | 752 |  761 | 743 | 748 | 750 |
| NaN | 745 | 747 | 0 | 761 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 0 | 748 | 750 | 744 |
| NaN | NaN | NaN | 746 | 748 | 0 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM*** | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 17 | 17 | 24 | 32 | 32 | NaN |
| 17 | 17 | 17/0 | 17 | 24 | 32 | 32 | NaN |
| 17 | 17 | 17 | 24 | 32 | 32 | 40 | 47 |
| NaN | 18 | 18 | NaN | 32 | 40 | 40 | 47 |
| NaN | 18 | 18 | 26 | NaN | 40 | 47 | 54 |
| NaN | NaN | NaN | 27 | 34 | NaN | NaN | 55 |
| NaN | NaN | NaN | 34 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

g=8, FAC=25

U=

D=

B=

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 761 | 750 | NaN |
| 763 | 768 | 768 | 752 |  761 | 743 | 748 | 750 |
| NaN | 745 | 747 | 768 | 761 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 0 | 748 | 750 | 744 |
| NaN | NaN | NaN | 746 | 748 | 0 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM*** | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 25 | 25 | 25 | 25 | 25 | NaN |
| 25 | 25 | 0 | 25/0 | 25/0 | 25/0 | 25 | NaN |
| 25 | 25/0 | 25/0 | 25/0 | 25/0 | 25 | 40 | 47 |
| NaN | 25 | 25/0 | 25/0 | 25 | 40 | 40 | 47 |
| NaN | 25 | 25 | 25 | NaN | 40 | 47 | 54 |
| NaN | NaN | NaN | 27 | 34 | NaN | NaN | 55 |
| NaN | NaN | NaN | 34 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

g=9, FAC=29

U=

D=

B=

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 761 | 750 | NaN |
| 763 | 768 | 768 | 752 |  761 | 743 | 748 | 750 |
| NaN | 745 | 747 | 768 | 761 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 768 | 748 | 750 | 744 |
| NaN | NaN | NaN | 746 | 748 | 0 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM*** | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 33 | 33 | 33 | 33 | 33 | NaN |
| 33 | 33 | 0 | 0 | 0 | 0 | 33 | NaN |
| 33 | 0 | 0 | 0 | 0 | 33 | 40 | 47 |
| NaN | 33 | 0 | 0 | 33 | 40 | 40 | 47 |
| NaN | 33 | 33 | 33/0 | 33 | 40 | 47 | 54 |
| NaN | NaN | NaN | 33 | 33 | NaN | NaN | 55 |
| NaN | NaN | NaN | 33 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |

 |

g=10, FAC=31

U=

D=

B=

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 761 | 750 | NaN |
| 763 | 768 | 768 | 752 |  761 | 743 | 748 | 750 |
| NaN | 745 | 747 | 768 | 761 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 768 | 748 | 750 | 744 |
| NaN | NaN | NaN | 746 | 748 | 768 | 0 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM*** | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 41 | 41 | 41 | 41 | 41 | NaN |
| 41 | 41 | 0 | 0 | 0 | 0 | 41 | NaN |
| 41 | 0 | 0 | 0 | 0 | 41 | 40 | 47 |
| NaN | 41 | 0 | 0 | 41 | 40 | 40 | 47 |
| NaN | 41 | 41 | 0 | 41 | 40 | 47 | 54 |
| NaN | NaN | NaN | 41 | 41/0 | 41 | NaN | 55 |
| NaN | NaN | NaN | 41 | 41 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |

 |

g=11, FAC=44

U=

D=

B=

|  |  |  |
| --- | --- | --- |
| ***FAC & FDR*** | ***maxH*** | ***D & U*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 1 | 1 | 1 | 1 | 1 | NaN |
| 1 | 1 | 2 | 2 | 2 | 4 | 1 | NaN |
| 1 | 3 | 9 | 3 | 5 | 1 | 1 | 1 |
| NaN | 1 | 4 | 25 | 7 | 1 | 2 | 2 |
| NaN | 1 | 1 | 1 | 29 | 4 | 3 | 1 |
| NaN | NaN | NaN | 1 | 2 | 31 | 44 | 1 |
| NaN | NaN | NaN | 1 | 1 | 1 | 1 | 1 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 767 | 755 | 752 | 761 | 758 | NaN |
| 768 | 764 | 767 | 755 | 752 | 761 | 750 | NaN |
| 763 | 768 | 768 | 752 |  761 | 743 | 748 | 750 |
| NaN | 745 | 747 | 768 | 761 | 744 | 748 | 750 |
| NaN | 747 | 747 | 745 | 768 | 748 | 750 | 744 |
| NaN | NaN | NaN | 746 | 748 | 768 | 768 | 731 |
| NaN | NaN | NaN | 748 | 744 | 739 | 743 | 741 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |
| ***B*** | ***BM*** | ***N1*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NaN | NaN | 48 | 48 | 48 | 48 | 48 | NaN |
| 48 | 48 | 0 | 0 | 0 | 0 | 48 | NaN |
| 48 | 0 | 0 | 0 | 0 | 48/0 | 48/0 | 48 |
| NaN | 48 | 0 | 0 | 48/0 | 48/0 | 48/0 | 48 |
| NaN | 48 | 48 | 0 | 48/0 | 48/0 | 48/0 | 48 |
| NaN | NaN | NaN | 48 | 0 | 48/0 | 48/0 | 48 |
| NaN | NaN | NaN | 48 | 48 | 48 | 48 | 48 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

 |
| ***N2*** | ***N3*** | ***N4*** |
|

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

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|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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In the ith iteration, the algorithm is carried out by the following steps

1. ***Array D*** are computed by using next downstream cells of Array U

$$D=\left\{\begin{array}{c}next\left(U\right), FAC\left[next\left(U\right)\right]=FAC\_{U}\{i\}\\U, FAC\left[next\left(U\right)\right]>FAC\_{U}\{i\}\end{array}\right.$$

The first case in the above equation refers to cells in blue background in the D & U map. These blue cells are the ONLY downstream cells the algorithm computes/updates all variables for. Yellow background cells are indeed upstream cells from the last iteration, whose next downstream cell has a larger FAC value. Variables of the yellow cells will be updated/computed during a later iteration. Pink cells represents last upstream cells to cells in the first case.

1. ***DU=***unique***(D), [Uu,ic]=unique (U), Du’=D(ic). Uu and Du’ also has a one-to-one relationship***
2. Matrix ***BM*** is firstly updated by simply setting value of boundary cells of all tributaries to the index of mouth cell, as well as the mouth cell itself. Using the one-to-one relationship among B-U-D, the below equation formulates this opration. In the ***BM*** map, boundary cells of the same mouth is denoted by the mouth index while the mouth cell is marked red.

$$\left\{\begin{array}{c}B\_{M}\left(B\right)=D\\B\_{M}\left[D\_{u}\right]=unique\left(D\_{u}\right)\end{array}\right.$$

1. Matrices***N 1- N4*** is computed from ***BM.*** If the ***BM.*** value of the facing direction is zero or the same value, ***Ni*** value is false, otherwise, it is true. It should be noted that only grids with a postive ***BM*** value arecomputed in ***N 1- N4*** during each iteration.
2. A tributary cell can change to a non-boundary cell after merging into a downstream basin, a changed cell, b, is identified by the following rule,
$∀b\in B\sum\_{i=1}^{4}N\_{i}\left(b\right)=0$.
3. ***B*** and ***D,*** is updated by inserting ***DU*** and then removing those changed non-boundary cells.
4. ***BM*** values at the removed cells are changed into 0 to denote an internal (non-boundary) basin cell. A transfer to zero sign, “/0” is used to denote these changed cells.
5. Tributary related geomorphologic variables (eg. ***maxH***) are computed using its own tributary values and the one to one relationship retrieved from ***Uu*** and ***Du’***.
6. Boundary related geomorphologic variables are computed using ***B*** and ***BM***
7. ***U*** is replaced by ***D*** for the next iteration.