

HW6

1. Minimum Spanning Tree Problem (Kruskal Algorithm)

โจทย์

1	10	2	7	3	8	4	15	5	14	6	10	7	4	8	18	9	6	10
6		12		8		10		18		9		14		11		3		15
11	4	12	5	13	3	14	9	15	2	16	12	17	5	18	20	19	10	20
13		10		19		10		11		4		11		4		5		17
21	15	22	19	23	9	24	9	25	7	26	20	27	6	28	17	29	16	30
15		14		2		7		9		13		8		16		12		13
31	14	32	9	33	18	34	1	35	17	36	17	37	18	38	16	39	12	40
5		4		3		4		19		14		4		3		5		1
41	14	42	5	43	5	44	12	45	6	46	19	47	19	48	11	49	6	50
11		16		2		10		3		17		16		14		9		2
51	16	52	11	53	3	54	17	55	13	56	9	57	1	58	11	59	17	60
13		10		14		16		17		2		8		2		1		4
61	2	62	8	63	18	64	10	65	1	66	11	67	16	68	13	69	3	70
7		7		6		13		6		10		5		11		3		19
71	14	72	10	73	8	74	11	75	5	76	8	77	12	78	13	79	20	80
10		2		3		3		9		2		17		15		14		13
81	15	82	16	83	10	84	9	85	16	86	1	87	7	88	13	89	19	90
4		18		12		5		18		1		18		1		9		12
91	11	92	7	93	14	94	13	95	12	96	8	97	10	98	15	99	17	100

Node  Arc 

หาเส้นทางที่ผ่านทุก Node โดยไม่เกิดวงจร ที่สั้นที่สุดเท่าที่ทำได้?

คำตอบ = 645 บาท

1	10	2	7	3	8	4	15	5	14	6	10	7	4	8	18	9	6	10
6		12		8		10		18		9		14		11		3		15
11	4	12	5	13	3	14	9	15	2	16	12	17	5	18	20	19	10	20
13		10		19		10		11		4		11		4		5		17
21	15	22	19	23	9	24	9	25	7	26	20	27	6	28	17	29	16	30
15		14		2		7		9		13		8		16		12		13
31	14	32	9	33	18	34	1	35	17	36	17	37	18	38	16	39	12	40
5		4		3		4		19		14		4		3		5		1
41	14	42	5	43	5	44	12	45	6	46	19	47	19	48	11	49	6	50
11		16		2		10		3		17		16		14		9		2
51	16	52	11	53	3	54	17	55	13	56	9	57	1	58	11	59	17	60
13		10		14		16		17		2		8		2		1		4
61	2	62	8	63	18	64	10	65	1	66	11	67	16	68	13	69	3	70
7		7		6		13		6		10		5		11		3		19
71	14	72	10	73	8	74	11	75	5	76	8	77	12	78	13	79	20	80
10		2		3		3		9		2		17		15		14		13
81	15	82	16	83	10	84	9	85	16	86	1	87	7	88	13	89	19	90
4		18		12		5		18		1		18		1		9		12
91	11	92	7	93	14	94	13	95	12	96	8	97	10	98	15	99	17	100

2. Maximum Spanning Tree Problem (Kruskal Algorithm)

จากโจทย์เดียวกัน หาเส้นทางที่ผ่านทุก Node โดยไม่เกิดวงจร ที่สั้นที่สุดเท่าไรสูงที่สุด?

คำตอบ = 1,387 บาท

1	10	2	7	3	8	4	15	5	14	6	10	7	4	8	18	9	6	10
6		12		8		10		18		9		14		11		3		15
11	4	12	5	13	3	14	9	15	2	16	12	17	5	18	20	19	10	20
13		10		19		10		11		4		11		4		5		17
21	15	22	19	23	9	24	9	25	7	26	20	27	6	28	17	29	16	30
15		14		2		7		9		13		8		16		12		13
31	14	32	9	33	18	34	1	35	17	36	17	37	18	38	16	39	12	40
5	4	3		4		19		14		4		3		5		1		
41	14	42	5	43	5	44	12	45	6	46	19	47	19	48	11	49	6	50
11		16		2		10		3		17		16		14		9		2
51	16	52	11	53	3	54	17	55	13	56	9	57	1	58	11	59	17	60
13		10		14		16		17		2		8		2		1		4
61	2	62	8	63	18	64	10	65	1	66	11	67	16	68	13	69	3	70
7		7		6		13		6		10		5		11		3		19
71	14	72	10	73	8	74	11	75	5	76	8	77	12	78	13	79	20	80
10		2		3		3		9		2		17		15		14		13
81	15	82	16	83	10	84	9	85	16	86	1	87	7	88	13	89	19	90
4		18		12		5		18		1		18		1		9		12
91	11	92	7	93	14	94	13	95	12	96	8	97	10	98	15	99	17	100

Algorithm of Kruskal

```

Kruskal(G=(V,E))
{
    T = ∅
    For (each vertex v ∈ V) MakeSet (v)
    Sort E by nondecreasing weight
    For (each edge (u,v) ∈ E in order by nondecreasing w){
        If (Find(u) ≠ Find(v)){
            T = T ∪ {(u,v)}
            Union(Find(u),Find(v))
        }
    }
    Return T
}

```

Visual Basic in Excel

```

Sub minimum_tree()
Call clear_sheet
m = 1
For k = 1 To 19 Step 2
    For i = 2 To 18 Step 2
        Cells(m, 20).Value = Cells(k, i).Value
        Cells(m, 21).Value = Cells(k, i - 1).Value
        Cells(m, 22).Value = Cells(k, i + 1).Value
        m = m + 1
    Next i
Next k
Call xxxx(m)
Call sort_x
Call xxxxx
End Sub

Sub xxxx(m)
For k = 2 To 18 Step 2
    For i = 1 To 19 Step 2
        Cells(m, 20).Value = Cells(k, i).Value
        Cells(m, 21).Value = Cells(k - 1, i).Value
        Cells(m, 22).Value = Cells(k + 1, i).Value
        m = m + 1
    Next i
Next k
End Sub

Sub sort_x()
Columns("T:V").Select
Selection.Sort Key1:=Range("T1"), Order1:=xlAscending, Header:=xlGuess, _
    OrderCustom:=1, MatchCase:=False, Orientation:=xlTopToBottom, _
    DataOption1:=xlSortNormal
End Sub
'ในกรณีหาค่าสูงสุดให้เปลี่ยนจาก xlAscending เป็น xlDescending
Sub xxxxx()
m = 180
row_for_set = 1
For i = 1 To m
    frist_c = 0
    sec_c = 0
    For j = 21 To 22
        If j = 22 Then
            ca = a
            cr = r
        End If
        If Cells(i, j).Value Mod 10 = 0 Then
            a = 19
        Else
            a = (Cells(i, j).Value Mod 10) + ((Cells(i, j).Value Mod 10) - 1)
        End If
    Next j
Next i

```

```

m = Cells(i, j).Value
Select Case m
Case Is <= 10
  r = 1
Case Is <= 20
  r = 3
Case Is <= 30
  r = 5
Case Is <= 40
  r = 7
Case Is <= 50
  r = 9
Case Is <= 60
  r = 11
Case Is <= 70
  r = 13
Case Is <= 80
  r = 15
Case Is <= 90
  r = 17
Case Is <= 100
  r = 19
End Select
If Cells(r, a).Interior.ColorIndex = 7 Then
  If j = 21 Then frist_c = 1 Else sec_c = 1
Else
  Cells(r, a).Interior.ColorIndex = 7
  If j = 21 Then frist_c = 0 Else sec_c = 0
End If
If j = 22 Then
  If cr = r Then
    Cells(r, (ca + a) / 2).Interior.ColorIndex = 7
  Else
    Cells((cr + r) / 2, a).Interior.ColorIndex = 7
  End If
End If
Next j
rr = 1
cc = 25
If frist_c = 1 And sec_c = 0 Then
  che = Cells(i, 21).Value
  Do While Cells(rr, cc).Value <> 0
    Do While Cells(rr, cc).Value <> 0
      If che = Cells(rr, cc).Value Then
        cc = cc + 1
        Do While Cells(rr, cc).Value <> 0
          cc = cc + 1
        Loop
        Cells(rr, cc).Value = Cells(i, 22).Value
        Cells(rr, 24).Value = Cells(rr, 24).Value + Cells(i, 20).Value
        che2 = Cells(r, 22).Value
        cc = 200
        rr = 200
      End If
      cc = cc + 1
    Loop
    cc = 25
    rr = rr + 1
  Loop
ElseIf frist_c = 0 And sec_c = 1 Then
  che = Cells(i, 22).Value
  Do While Cells(rr, cc).Value <> 0
    Do While Cells(rr, cc).Value <> 0
      If che = Cells(rr, cc).Value Then
        cc = cc + 1
        Do While Cells(rr, cc).Value <> 0
          cc = cc + 1
        Loop
        Cells(rr, cc).Value = Cells(i, 21).Value
        Cells(rr, 24).Value = Cells(rr, 24).Value + Cells(i, 20).Value
        che2 = Cells(r, 21).Value
        cc = 200
        rr = 200
      End If
      cc = cc + 1
    Loop
  Loop

```

```

    cc = 25
    rr = rr + 1
Loop
ElseIf frist_c = 0 And sec_c = 0 Then
    Range(Cells(i, 20), Cells(i, 22)).Select
    Selection.Copy
    Range(Cells(row_for_set, 24), Cells(row_for_set, 26)).Select
    ActiveSheet.Paste
    row_for_set = row_for_set + 1
End If
If frist_c = 1 And sec_c = 1 Then
    che = Cells(i, 21).Value
    che2 = Cells(i, 22).Value
    Do While Cells(rr, cc).Value <> 0
        Do While Cells(rr, cc).Value <> 0
            If che = Cells(rr, cc).Value Then
                cc = cc + 1
                Do While Cells(rr, cc).Value <> 0
                    cc = cc + 1
                Loop
                GoTo c
            End If
            cc = cc + 1
        Loop
        cc = 25
        rr = rr + 1
    Loop
c:
    rrr = 1
    ccc = 25
    Do While Cells(rrr, ccc).Value <> 0
        Do While Cells(rrr, ccc).Value <> 0
            If che2 = Cells(rrr, ccc).Value Then
                If rrr = rr Then
                    If cr = r Then
                        Cells(r, (ca + a) / 2).Interior.ColorIndex = xlNone
                    Else
                        Cells((cr + r) / 2, a).Interior.ColorIndex = xlNone
                    End If
                End If
                ccc = 200
                rrr = 200
            Else
                'Range(Cells(rrr, ccc), Cells(rrr, ccc)).Select
                'Selection.Delete Shift:=xlToLeft
                Range(Cells(rrr, 25), Cells(rrr, 130)).Select
                Selection.Copy
                Range(Cells(rr, cc), Cells(rr, cc)).Select
                ActiveSheet.Paste
                Cells(rr, 24).Value = Cells(rrr, 24).Value + Cells(rr, 24).Value + Cells(i, 20).Value
                Range(Cells(rrr, 24), Cells(rrr, 24 + 180)).Select
                Selection.Delete Shift:=xlUp
                row_for_set = row_for_set - 1
                ccc = 200
                rrr = 200
            End If
        End If
        ccc = ccc + 1
    Loop
    ccc = 25
    rrr = rrr + 1
    Loop
End If
Range(Cells(1, 1), Cells(1, 1)).Activate
Next i

End Sub

```