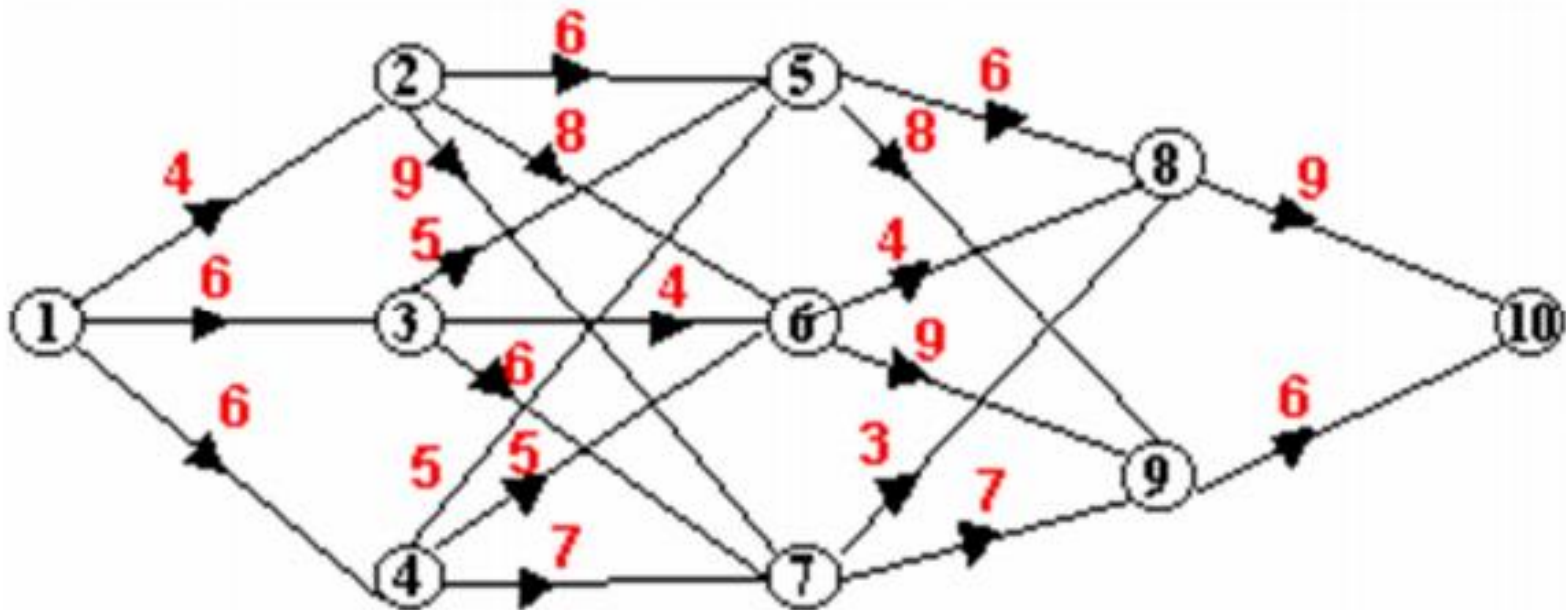


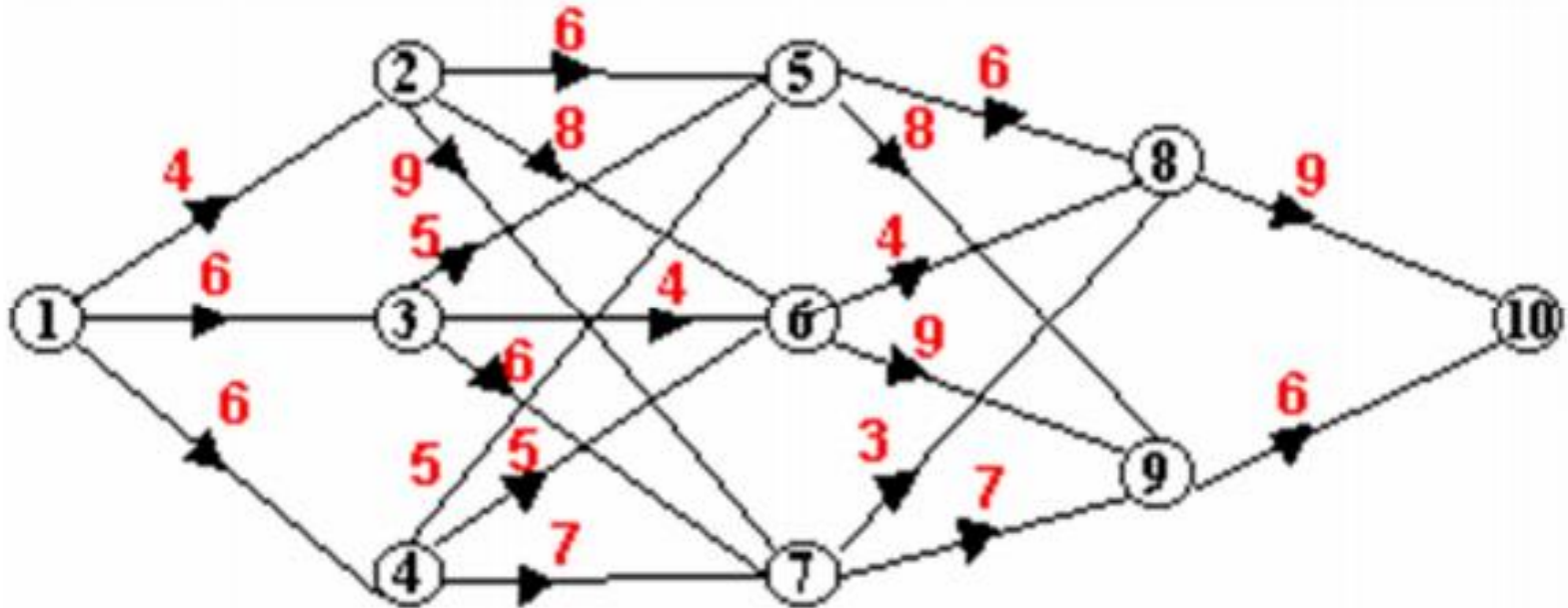
Latihan DP

Pengajar IF2211 Strategi Algoritma

PR 1a: Shortest Path 1→10



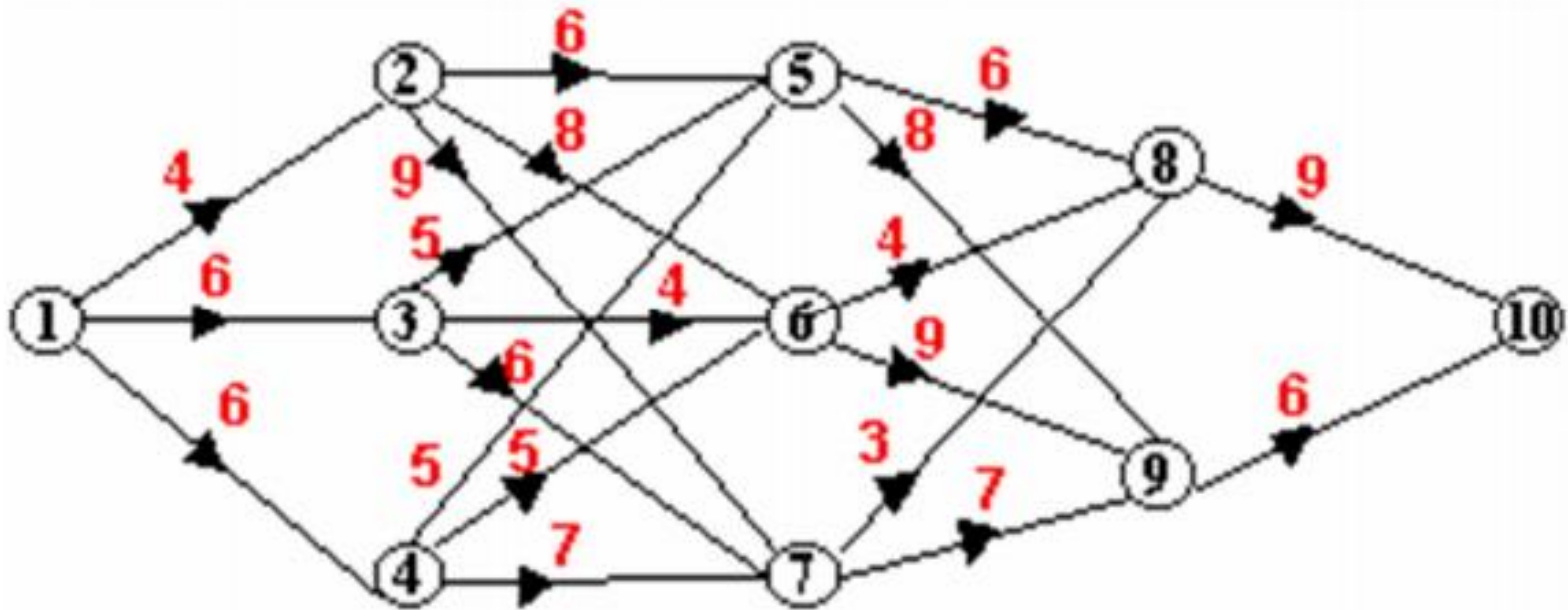
Tahap 1: $f_1(s) = c_{x_1 s} \{basis\}$



- $x_1 = 1; s \in \{2,3,4\}; f_1(2)=4; f_1(3)=6; f_1(4)=6; x_1^* = 1$

s	Solusi Optimum	
	$f_1(s)$	x_1^*
2	4	1
3	6	1
4	6	1

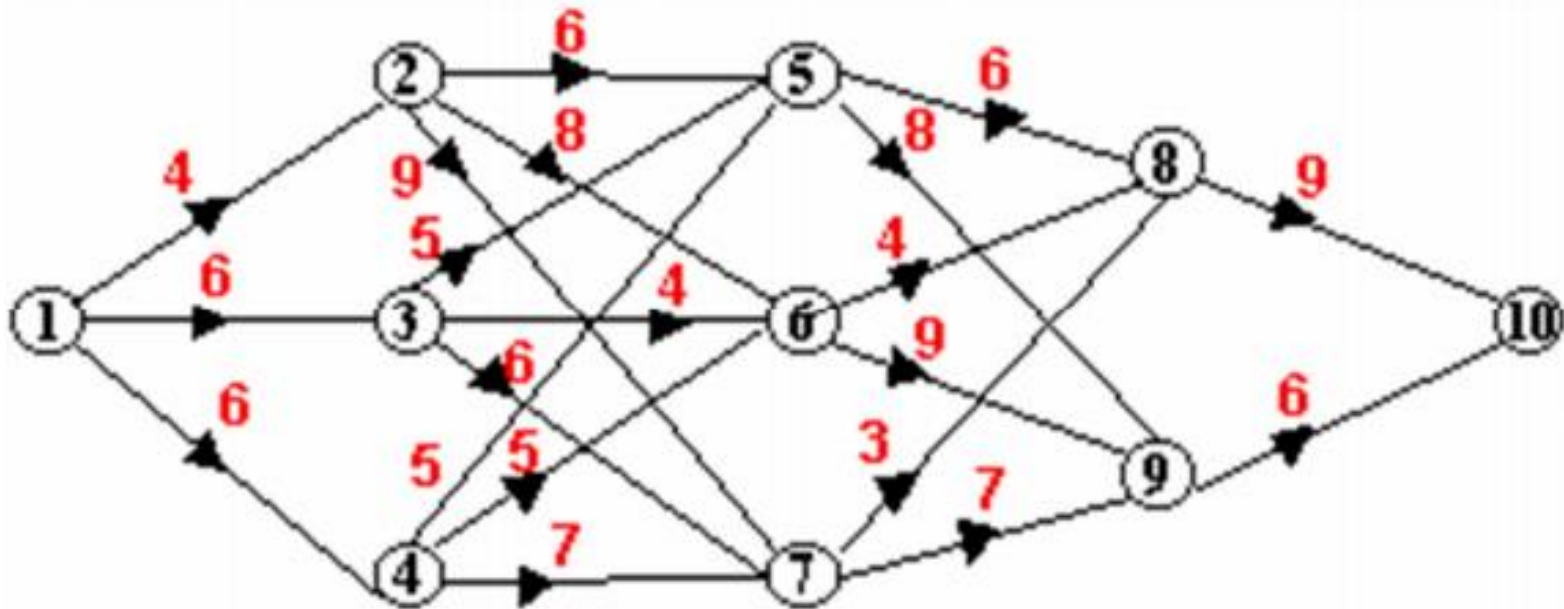
Tahap 2: $f_2(s) = \min_{x_2} \{c_{x_2 s} + f_1(x_2)\}$



- $x_2 \in \{2, 3, 4\}$; $s \in \{5, 6, 7\}$; $f_1(2)=4$; $f_1(3)=6$; $f_1(4)=6$

$s \setminus x_2$	$f_2(x_2, s) = c_{x_2 s} + f_1(x_2)$			Solusi Optimum	
	2	3	4	$f_2(s)$	x_2^*
5	$6+4=10$	$5+6=11$	$5+6=11$	10	2
6	$8+4=12$	$4+6=10$	$5+6=11$	10	3
7	$9+4=13$	$6+6=12$	$7+6=13$	12	3

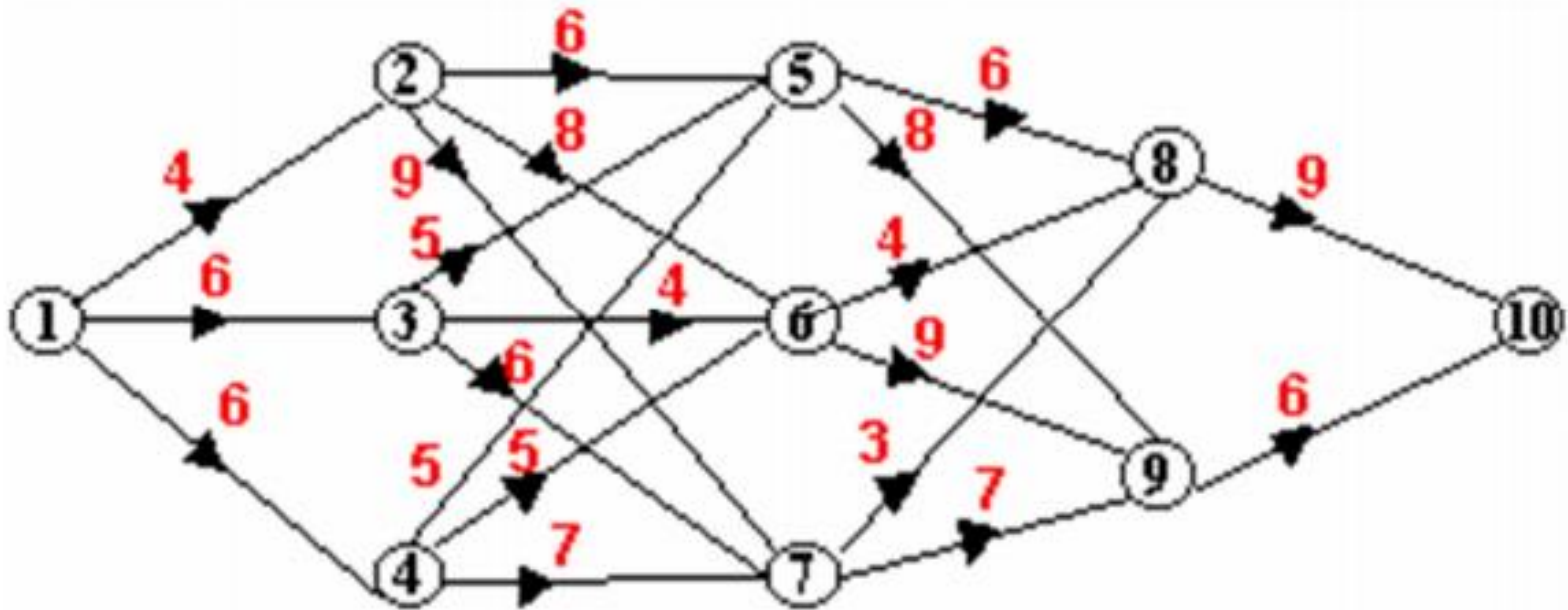
Tahap 3: $f_3(s) = \min_{x_3} \{c_{x_3 s} + f_2(x_3)\}$



- $x_3 \in \{5, 6, 7\}; s \in \{8, 9\}; f_2(5)=10; f_2(6)=10; f_2(7)=12$

$s \setminus x_3$	$f_3(x_3, s) = c_{x_3 s} + f_2(x_3)$			Solusi Optimum	
	5	6	7	$f_3(s)$	x_3^*
8	$6 + 10 = 16$	$4 + 10 = 14$	$3 + 12 = 15$	14	6
9	$8 + 10 = 18$	$9 + 10 = 19$	$7 + 12 = 19$	18	5

Tahap 4: $f_4(s) = \min_{x_4} \{c_{x_4 s} + f_3(x_4)\}$



- $x_4 \in \{8, 9\}; s=10; f_3(8)=14; f_3(9)=18$

$s \setminus x_4$	$f_4(x_4, s) = c_{x_4 s} + f_3(s)$		Solusi Optimum	
	8	9	$f_4(s)$	x_4^*
10	$9 + 14 = 23$	$6 + 18 = 24$	23	8

s	Solusi Optimum	
	$f_1(s)$	x_1^*
2	4	1
3	6	1
4	6	1

s \ x_2	Solusi Optimum	
	$f_2(s)$	x_2^*
5	10	2
6	10	3
7	12	3

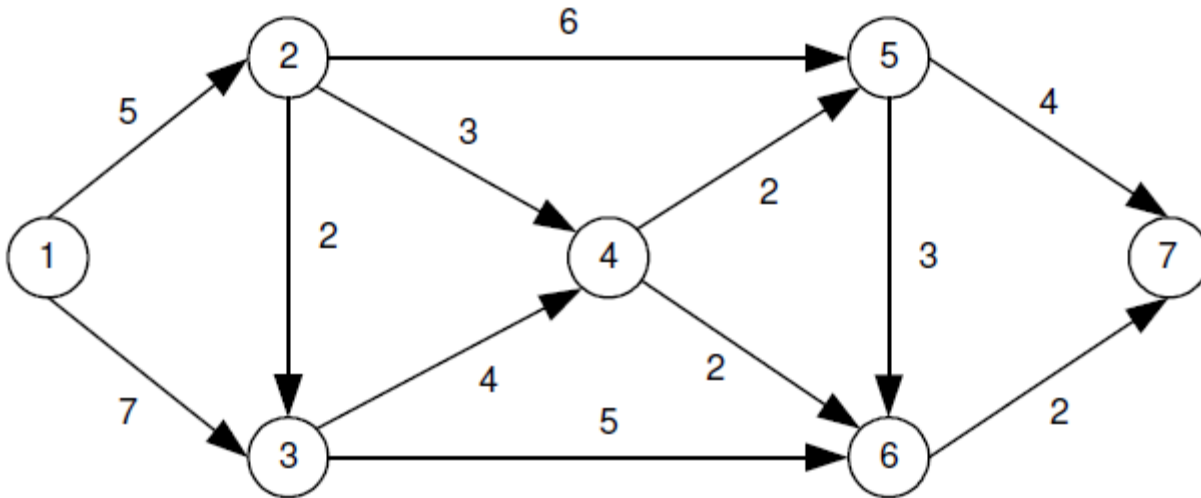
s \ x_3	Solusi Optimum	
	$f_3(s)$	x_3^*
8	14	6
9	18	5

s \ x_4	Solusi Optimum	
	$f_4(s)$	x_4^*
10	23	8

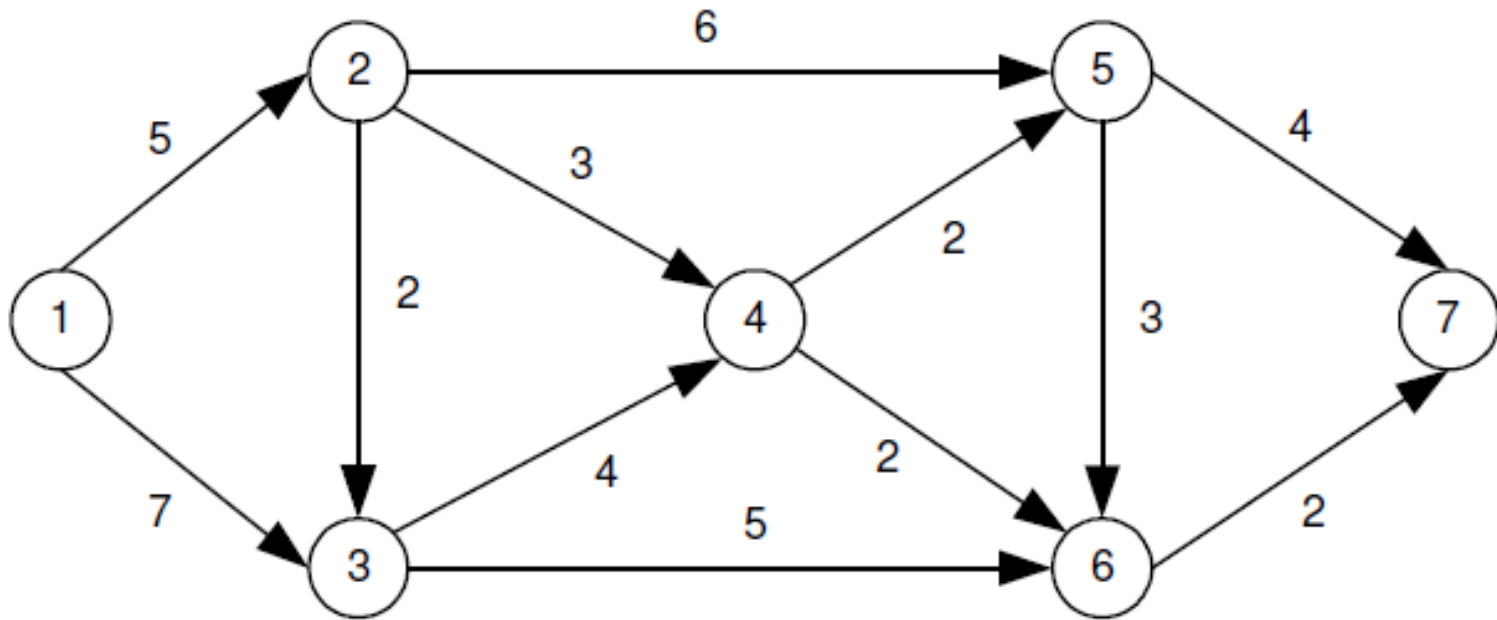
- Pembentukan solusi optimum:

$10 \leftarrow 8 \leftarrow 6 \leftarrow 3 \leftarrow 1$

PR 1b: $1 \rightarrow 7$



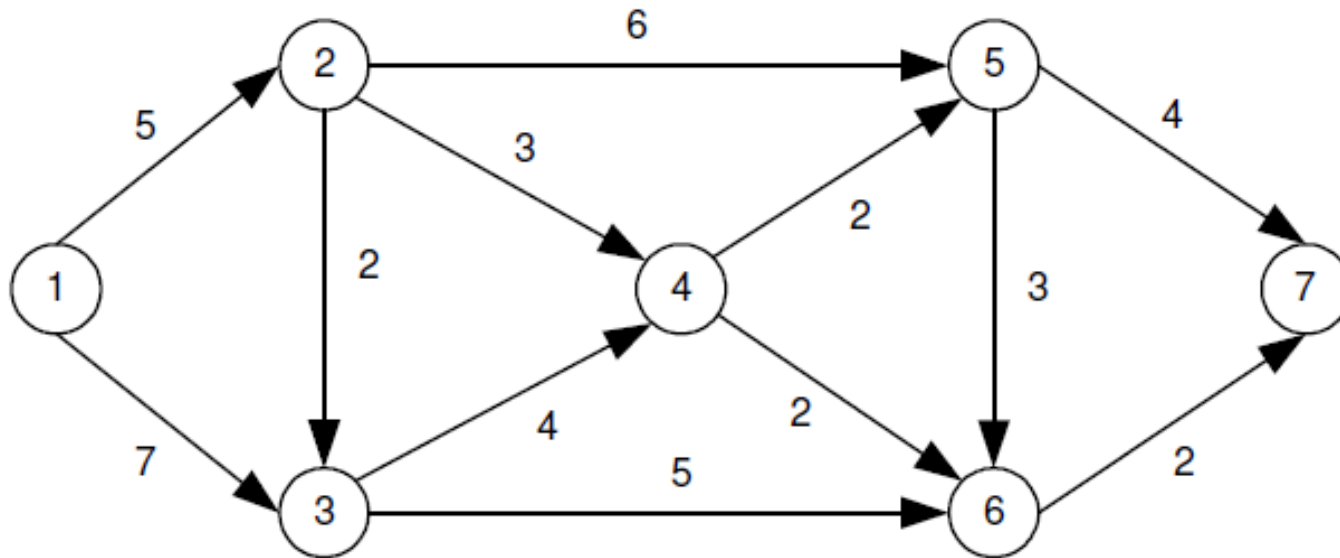
Tahap 1: $f_1(s) = c_{x_1 s} \{basis\}$



- $x_1 = 1; s \in \{2, 3\}; f_1(2) = 5; f_1(3) = 7; x_1^* = 1$

s	Solusi Optimum	
	$f_1(s)$	x_1^*
2	5	1
3	7	1

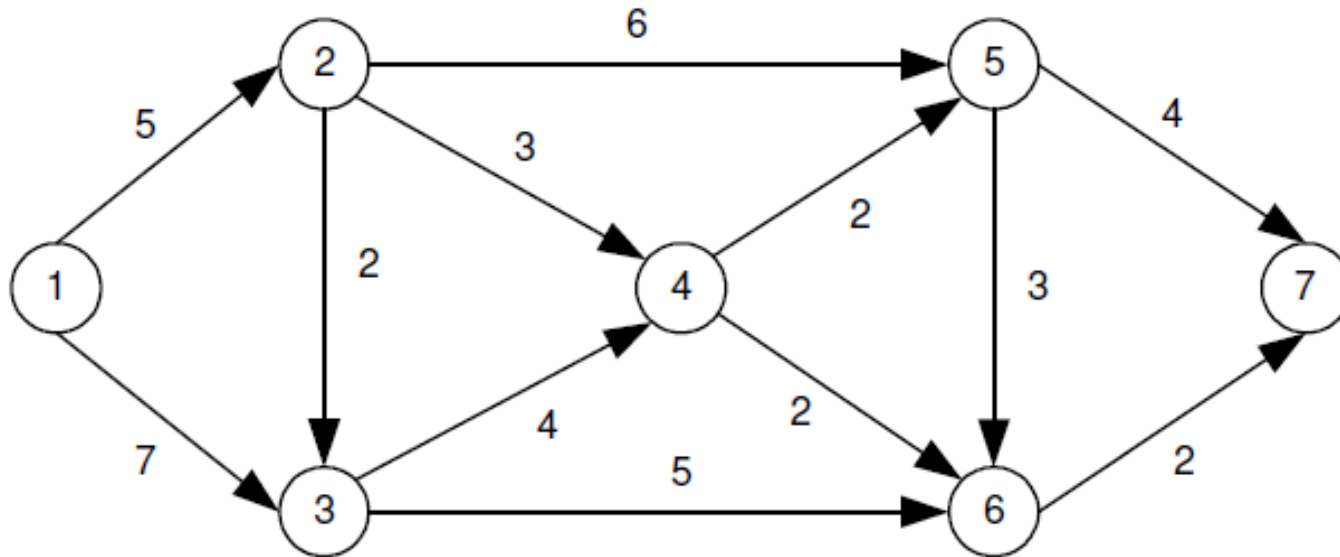
Tahap 2: $f_2(s) = \min_{x_2} \{c_{x_2 s} + f_1(x_2)\}$



- $x_2 \in \{2, 3\}; s \in \{2', 3', 4\}; f_1(2)=5; f_1(3)=7$

$s \setminus x_2$	$f_2(x_2, s) = c_{x_2 s} + f_1(x_2)$		Solusi Optimum	
	2	3	$f_2(s)$	x_2^*
2'	$0+5=5$	-	5	2
3'	$2+5=7$	$0+7=7$	7	2 atau 3
4	$3+5=8$	$4+7=11$	8	2

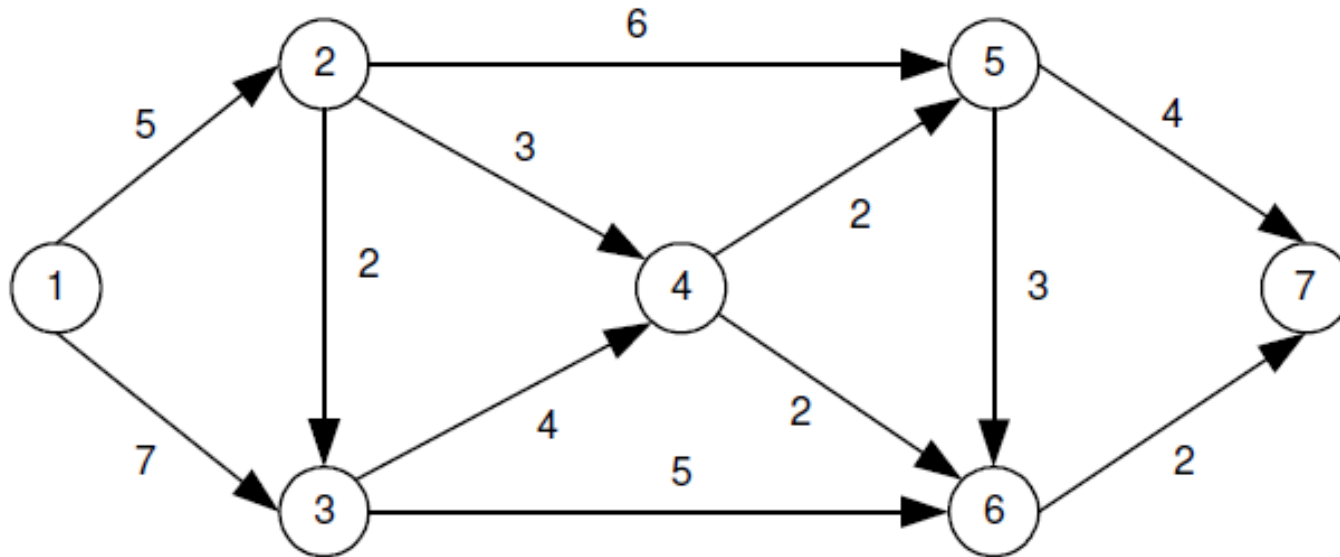
Tahap 3: $f_3(s) = \min_{x_3} \{c_{x_3 s} + f_2(x_3)\}$



- $x_2 \in \{2', 3', 4\}$; $s \in \{5, 6\}$; $f_2(2')=5$; $f_2(3')=7$; $f_2(4)=8$

$s \setminus x_2$	$f_2(x_2, s) = c_{x_2 s} + f_1(x_2)$			Solusi Optimum	
	2'	3'	4	$f_3(s)$	x_3^*
5	$6+5=11$	-	$2+8=12$	11	2'
6	-	$5+7=12$	$2+8=10$	10	4

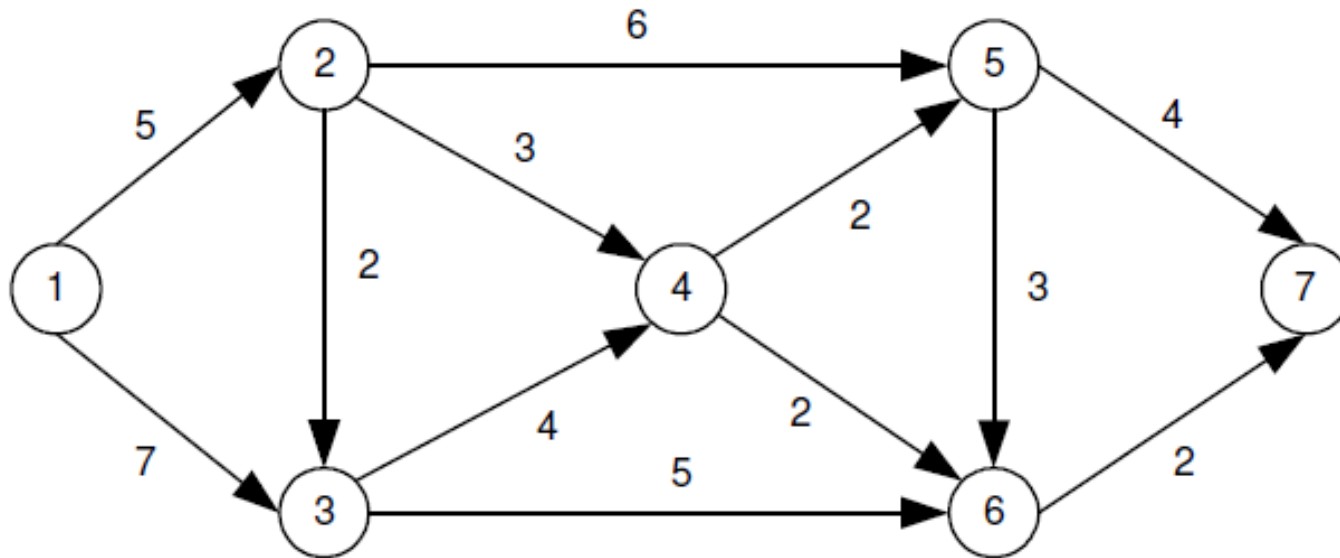
Tahap 4: $f_4(s) = \min_{x_4} \{c_{x_4 s} + f_3(x_4)\}$



- $x_2 \in \{5, 6\}; s \in \{5', 6'\}; f_3(5)=11; f_3(6)=10$

$s \setminus x_2$	$f_2(x_2, s) = c_{x_2 s} + f_1(x_2)$		Solusi Optimum	
	5	6	$f_4(s)$	x_4^*
5'	0+11=11	-	11	5
6'	6+11=11	0+10=10	10	6

Tahap 5: $f_5(s) = \min_{x_5} \{c_{x_5 s} + f_4(x_5)\}$



- $x_2 \in \{5', 6'\}; s \in \{7\}; f_4(5')=11; f_4(6')=10$

$s \setminus x_2$	$f_2(x_2, s) = c_{x_2 s} + f_1(x_2)$		Solusi Optimum	
	5'	6'	$f_5(s)$	x_5^*
7	$4 + 11 = 15$	$2 + 10 = 12$	12	6'

s	Solusi Optimum	
	$f_1(s)$	x_1^*
2	5	1
3	7	1

s \ x ₂	Solusi Optimum	
	$f_2(s)$	x_2^*
2'	5	2
3'	7	2 atau 3
4	8	2

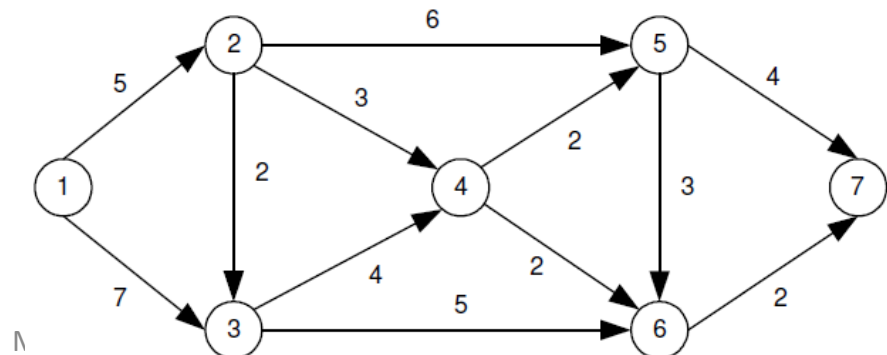
s \ x ₂	Solusi Optimum	
	$f_3(s)$	x_3^*
5	11	2'
6	10	4

s \ x ₂	Solusi Optimum	
	$f_4(s)$	x_4^*
5'	11	5
6'	10	6

s \ x ₂	Solusi Optimum	
	$f_5(s)$	x_5^*
7	12	6'

- Pembentukan solusi optimum:

$7 \leftarrow 6' \leftarrow 6 \leftarrow 4 \leftarrow 2 \leftarrow 1$



PR 2

2. Selesaikan persoalan *Integer Knapsack* berikut dengan Program Dinamis. Perhatikan perhitungannya dengan tabel.

$$K = 6$$

$$(w_1, w_2, w_3, w_4) = (3, 2, 2, 1)$$

$$(p_1, p_2, p_3, p_4) = (35, 80, 60, 95)$$

- Relasi rekurens untuk persoalan ini adalah

$$f_0(y) = 0, \quad y = 0, 1, 2, \dots, M \quad (\text{basis})$$

$$f_k(y) = -\infty, \quad y < 0 \quad (\text{basis})$$

$$f_k(y) = \max\{f_{k-1}(y), p_k + f_{k-1}(y - w_k)\}, \quad (\text{rekurens})$$
$$k = 1, 2, \dots, n$$

Solusi 2

$$K = 6$$

$$(w_1, w_2, w_3, w_4) = (3, 2, 2, 1)$$

$$(p_1, p_2, p_3, p_4) = (35, 80, 60, 95)$$

- Tahap 1: $f_1(y) = \max(f_0(y), p_1 + f_0(y-3))$

y	$f_0(y)$	$p_1 + f_0(y-3)$	$f_1(y)$	$(x_1^*, x_2^*, x_3^*, x_4^*)$
0	0	$35 + -\infty = -\infty$	0	(0,0,0,0)
1	0	$35 + -\infty = -\infty$	0	(0,0,0,0)
2	0	$35 + -\infty = -\infty$	0	(0,0,0,0)
3	0	$35 + 0 = 35$	35	(1,0,0,0)
4	0	$35 + 0 = 35$	35	(1,0,0,0)
5	0	$35 + 0 = 35$	35	(1,0,0,0)
6	0	$35 + 0 = 35$	35	(1,0,0,0)

Solusi 2

$$K = 6$$

$$(w_1, w_2, w_3, w_4) = (3, 2, 2, 1)$$

$$(p_1, p_2, p_3, p_4) = (35, 80, 60, 95)$$

- Tahap 2: $f_2(y) = \max(f_1(y), p_2 + f_1(y-2))$

y	$f_1(y)$	$p_2 + f_1(y-2)$	$f_2(y)$	$(x_1^*, x_2^*, x_3^*, x_4^*)$
0	0	$80 + -\infty = -\infty$	0	(0,0,0,0)
1	0	$80 + -\infty = -\infty$	0	(0,0,0,0)
2	0	$80 + 0 = 80$	80	(0,1,0,0)
3	35	$80 + 0 = 80$	80	(0,1,0,0)
4	35	$80 + 0 = 80$	80	(0,1,0,0)
5	35	$80 + 35 = 115$	115	(1,1,0,0)
6	35	$80 + 35 = 115$	115	(1,1,0,0)

Solusi 2

$$K = 6$$

$$(w_1, w_2, w_3, w_4) = (3, 2, 2, 1)$$

$$(p_1, p_2, p_3, p_4) = (35, 80, 60, 95)$$

- Tahap 3: $f_3(y) = \max(f_2(y), p_3 + f_2(y-2))$

y	$f_1(y)$	$p_2 + f_1(y-2)$	$f_2(y)$	$(x_1^*, x_2^*, x_3^*, x_4^*)$
0	0	$60 + -\infty = -\infty$	0	(0,0,0,0)
1	0	$60 + -\infty = -\infty$	0	(0,0,0,0)
2	80	$60 + 0 = 60$	80	(0,1,0,0)
3	80	$60 + 0 = 60$	80	(0,1,0,0)
4	80	$60 + 80 = 140$	140	(0,1,1,0)
5	115	$60 + 80 = 140$	140	(0,1,1,0)
6	115	$60 + 80 = 140$	140	(0,1,1,0)

Solusi 2

$$K = 6$$

$$(w_1, w_2, w_3, w_4) = (3, 2, 2, 1)$$

$$(p_1, p_2, p_3, p_4) = (35, 80, 60, 95)$$

- Tahap 4: $f_4(y) = \max(f_3(y), p_4 + f_3(y-1))$

y	$f_1(y)$	$p_2 + f_1(y-1)$	$f_2(y)$	$(x_1^*, x_2^*, x_3^*, x_4^*)$
0	0	$95 + -\infty = -\infty$	0	(0,0,0,0)
1	0	$95 + 0 = 95$	95	(0,0,0,1)
2	80	$95 + 0 = 95$	95	(0,0,0,1)
3	80	$95 + 80 = 175$	175	(0,1,0,1)
4	140	$95 + 80 = 175$	175	(0,1,0,1)
5	140	$95 + 140 = 235$	235	(0,1,1,1)
6	140	$95 + 140 = 235$	235	(0,1,1,1)

Solusi optimum: $X = (0, 1, 1, 1)$ dengan profit 235