LO6 towards the end.

LO7 [a] $P(i,c)$ denotes the maximum profit for the given problem.

b]

$$P(i,c) = \begin{cases} 0 & \text{if } i=0 \text{ or } c \le 0 \\ \max(P(i-1,c), P(i-1,c-w_i) + p_i) & \text{if } w_i \le c \\ P(i-1,c) & \text{otherwise.} \end{cases}$$

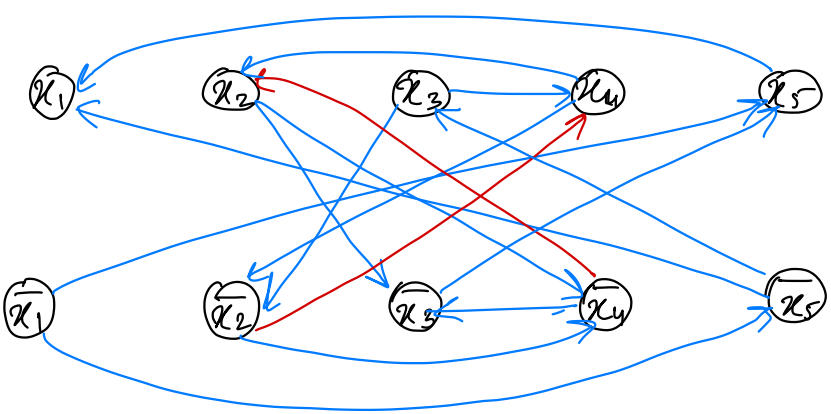
c]

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 30 | 30 | 30 | 30 | 30 | 30 |
| 2 | 0 | 0 | 0 | 0 | 30 | 30 | 30 | 30 | 30 | 60 | 60 |
| 3 | 0 | 20 | 20 | 20 | 20 | 50 | 50 | 50 | 50 | 60 | 80 |
| 4 | 0 | 20 | 20 | 20 | 40 | 60 | 60 | 60 | 70 | 90 | 90 |
| 5 | 0 | 20 | 20 | 20 | 40 | 60 | 60 | 60 | 70 | 90 | 90 |
| 6 | 0 | 20 | 20 | 20 | 40 | 60 | 80 | 80 | 80 | 100 | 120 |

$w_3 + w_4 + w_6 = 120$

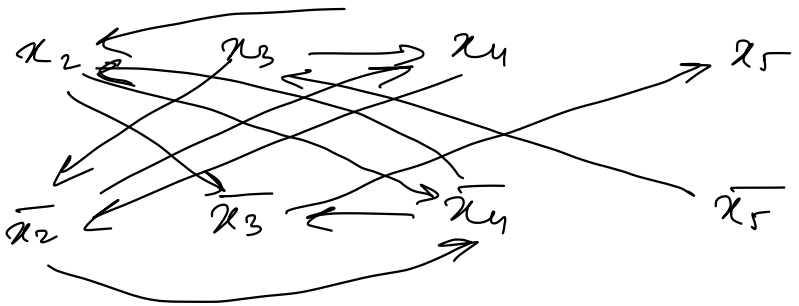
[08] a]

| Clause | Implication | Contrapositive. |
|---|---|---|
| $x_1, \bar{x}_5$ | $\bar{x}_1 \to \bar{x}_5$ | $x_5 \to x_1$ |
| $x_1, x_5$ | $\bar{x}_1 \to x_5$ | $\bar{x}_5 \to x_1$ |
| $\bar{x}_2, \bar{x}_3$ | $x_2 \to \bar{x}_3$ | $x_3 \to \bar{x}_2$ |
| $\bar{x}_2, \bar{x}_4$ | $x_2 \to \bar{x}_4$ | $x_4 \to \bar{x}_2$ |
| $x_2, x_4$ | $\bar{x}_2 \to x_4$ | $\bar{x}_4 \to x_2$ |
| $x_2, \bar{x}_4$ | $\bar{x}_2 \to \bar{x}_4$ | $x_4 \to x_2$ |
| $\bar{x}_3, x_4$ | $x_3 \to x_4$ | $\bar{x}_4 \to \bar{x}_3$ |
| $x_3, x_5$ | $\bar{x}_3 \to x_5$ | $\bar{x}_5 \to x_3$ |



b] $l_{x_1} = \{x_1\}$ → consistent  $R_{\bar{x}_1} = \{$

$\alpha R_{x_1} = \{x_1 = 1\}$




$l_{x_2} = \{\bar{x}_3, \bar{x}_4, x_5, x_2\}$ consistent.

From $R_{x_1}$ & $R_{x_2}$

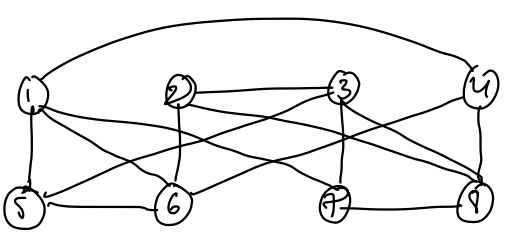
$x_1 = 1 \quad x_2 = 1 \quad x_3 = 0 \quad x_4 = 0 \quad x_5 = 1$

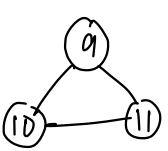
c] $234 \times 2 = 468$.

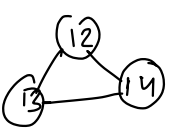
Q9] a] refer to previous CO solution.

b] $n = 8 \quad k = 3 \quad k \leq n/2$

$\therefore 8 - 6 = 2$




c] The original graph requires at least $4 > 3$ vertices in a vertex cover since it has two triangles: 1,5,6 & 3,8,7. Therefore $f(G, k)$ requires at least $8 > 7$ vertices in any cover.

LO 10] a] Certificate C is a subset of B where $|C| = k$

b] verifier algorithm input : i] certificate C

ii] Instance of (B, k)

```
resultvector=[0,0....0] → m length.
for i from 1 to m
    for j from 1 to k
      resultvector[j] = resultvector[j] | C[j][i]

for element in resultvector:
    if element == 0:
        return 0
return 1.
```

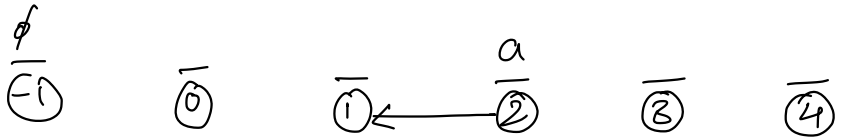
c] m = length of each vector

n = no. of vectors.

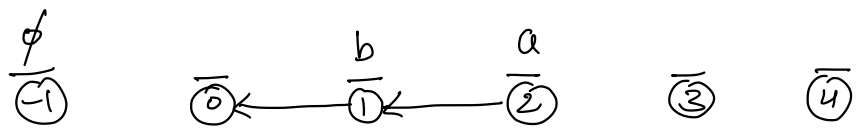
k = non negative integer

d] $O(mn)$.

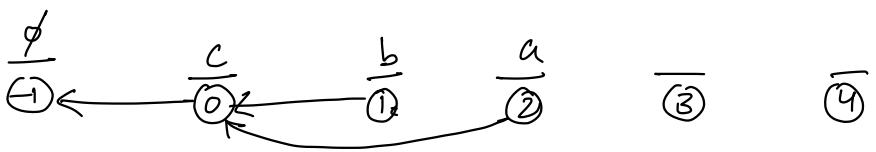
LOG] (a, 2) → 60



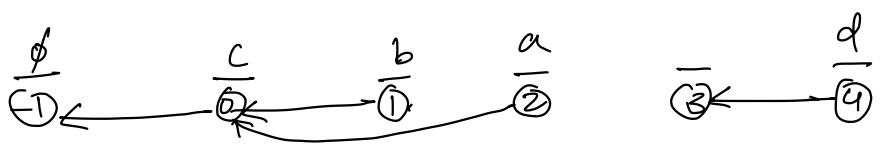

(b, 1) → 50



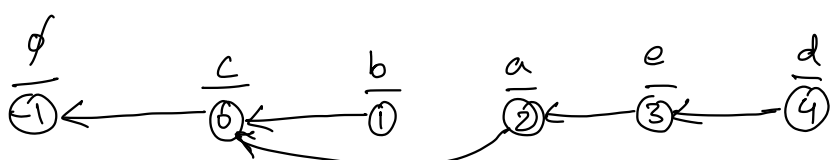

(c, 2) → 40




(d, 4) → 30




(e, 3) → 20




(f, 4) → 10