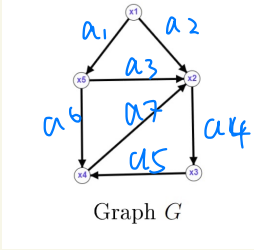


Graph G

1.

a). $\Gamma(x_2) = \{x_3\}$

b). $\Gamma^{-1}(x_2) = \{x_1, x_5, x_4\}$.

c) $\Gamma^2(x_2) = \{x_4\}$.

d) $\Gamma^{-2}(x_2) = \{x_1, x_4, x_5\}$.

e) $d_0(x_2) = 1$

f) $d_t(x_2) = 3$

g)

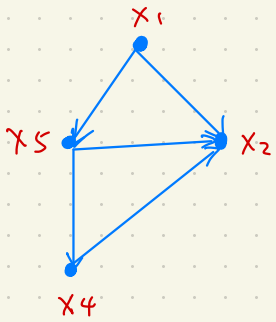
$$A = \begin{pmatrix} 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 \end{pmatrix}$$

h)

$$B = \begin{pmatrix} 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & -1 & -1 & 1 & 0 & 0 & -1 \\ 0 & 0 & 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & -1 & 1 \\ -1 & 0 & 1 & 0 & 0 & 1 & 0 \end{pmatrix}$$

i) $\Gamma_S(x_1) = \Gamma(x_1) \cap \{x_1, x_2, x_4, x_5\}$.

$= \{x_2, x_5\}$.

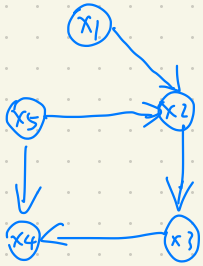


$\Gamma_S(x_5) = \{x_2, x_4\}$

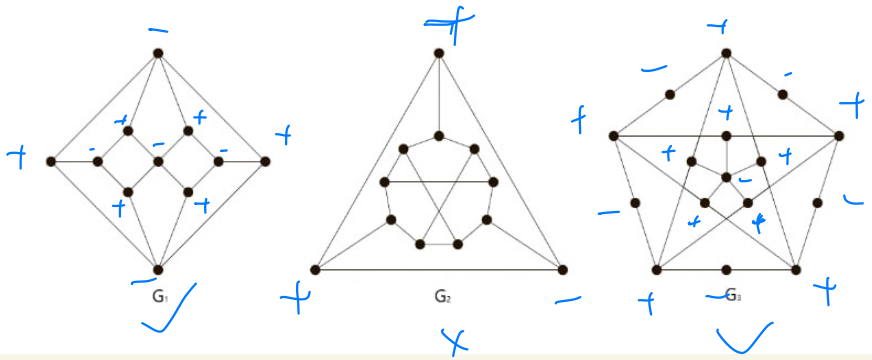
$\Gamma_S(x_4) = \{x_2\}$

$\Gamma_S(x_2) = \phi$

(j)



2.



G_1, G_3 are bipartite.