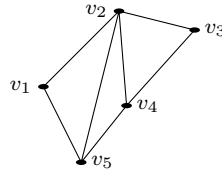


19 Additional applications – Assignment questions

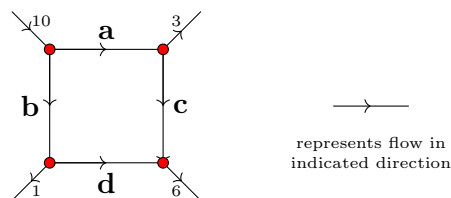
AP1HS77. Use adjacency matrices to compute the number of paths of length 3 from vertex i to vertex j in the following graph for every pair (i, j) with $i, j \in \{1, \dots, 5\}$.



AP2HS78. At each node $\bullet$ require

$$(\text{sum of flows in}) = (\text{sum of flows out}).$$

Determine a, b, c and d in the network



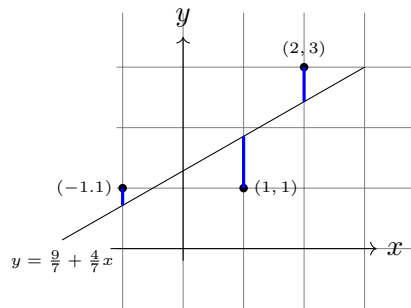
AP3HS138. Suppose that the data set of assignment and exam marks for 7 students is

<i>Student</i>	<i>AssignmentMark</i>	<i>ExamMark</i>
$S1$	99	100
$S2$	80	82.5
$S3$	79	79
$S4$	75.5	82.5
$S5$	87.5	91
$S6$	67	67.5
$S7$	76	68

Calculate the mean assignment mark μ_A , the mean exam mark μ_E and the correlation $\text{corr}(A, E) = \cos(\theta(A - \mu_A, E - \mu_E))$ between the assignment marks and the exam marks.

AP4HS139. Given the data set $D = \{(-1, 1), (1, 1), (2, 3)\}$ let

$$A = \begin{pmatrix} 1 & -1 \\ 1 & 1 \\ 1 & 2 \end{pmatrix} \quad \text{and} \quad \vec{y} = \begin{pmatrix} 1 \\ 1 \\ 3 \end{pmatrix}.$$



Compute

$$\vec{s} = (A^t A)^{-1} A^t \vec{y} = \begin{pmatrix} a_{\text{best}} \\ b_{\text{best}} \end{pmatrix}$$

and determine the list of best fit $y = a_{\text{best}} + b_{\text{best}}x$ for the data set D .