MATH1058: Problem Sheet 7

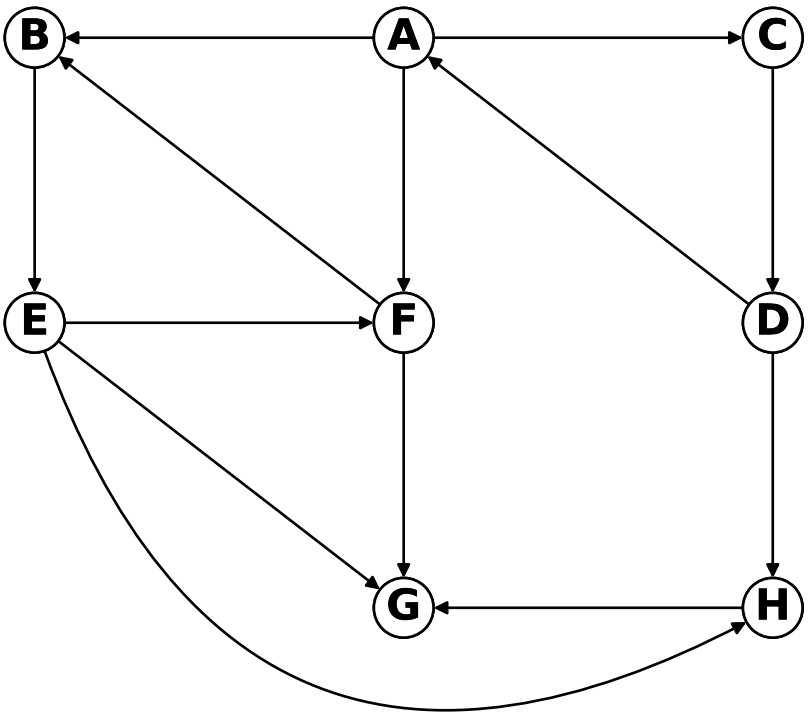
Problem 1 (Hiring and training)**.** *mySolutions has estimated the following demand (in hours) for the next 5 months:*

Month	*1*	*2*	*3*	*4*	*5*
Demand	*5000*	*6000*	*7000*	*8500*	*10000*

50 senior members of staff are available at the beginning of month 1, each of them working for no more than 160 hours per month. To satisfy the monthly demand, mySolutions can hire junior members of staff who, to receive the necessary authorizations to work, require a training period of one month each, during which each of them is trained, individually, by a senior member of staff for a total of 50 hours. After the training month, junior members of staff are promoted to senior level. Senior members of staff are paid 2000 GBP per month, while junior members are paid, during their training period, 1000 GBP per month. Working at mySolutions is highly stressful and, a consequence, the company has estimated that, at end of each month, 4% of its senior members of staff could/would leave and move on to a new job.

Propose an (integer) linear programming formulation for the problem of finding a hiring plan of minimum cost which satisfies the monthly demand.

Problem 2 (Directed graphs)**.**



Identify a path between nodes C and E, a cycle containing node A, the forward star of node E and the out-degree of node E, the backward star of node G and the in-degree of node G, the forward cut induced by the set $\{B, E\}$, the backward cut induced by the set $\{G, H\}$.