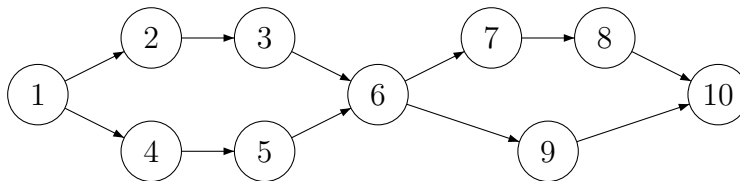# Advanced Programming, II Semester, 2011–2012
Quiz 4, 13 March 2012

Answer all questions in the space provided. Use the reverse for rough work, if any.
Don't forget to fill your name!

1. How many topological orderings does the following directed acyclic graph have?


In any valid linearization, the vertices $\{2,3,4,5\}$ must come between 1 and 6 and the vertices $\{7,8,9\}$ must come between 6 and 10. If we fix the positions of $\{2,3\}$, the positions of $\{4,5\}$ are decided. Likewise if we fix the positions of $\{7,8\}$, the position of 9 is decided. This gives us the following calculation for the total number of orderings.
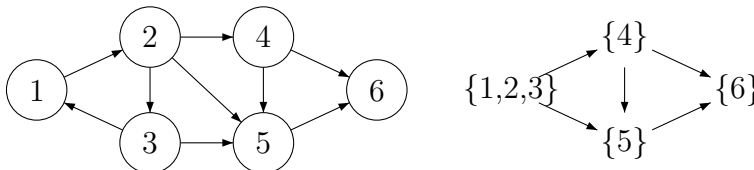
$$\binom{4}{2} \times \binom{3}{2} = 6 \times 3 = 18$$

(5 marks)

2. Orient the edges of the following undirected graph so that the resulting directed graph has *four* strongly connected components. Draw the corresponding scc dag—label each vertex of the dag with the corresponding scc.
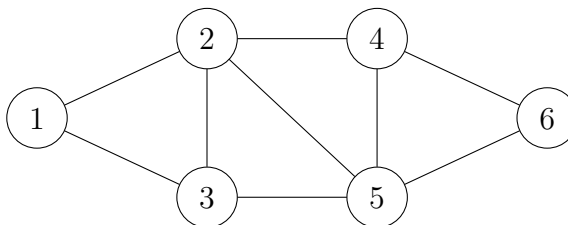
The smallest nontrivial scc one can generate is a triangle. This means that the other three scc's must be singletons. You can orient any triangle as an scc and set up the other edges appropriately. For instance:

(5 marks)