Department of Basic Sciences — Philadelphia University

Exam 2 **Graph Theory** **14–05–2018**

Section A. (1 point each) Short Answer

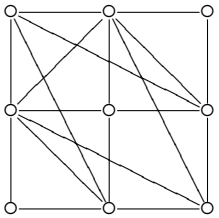
1. Given the incidence matrix Z of a graph, find the distance matrix D.

$$Z = \begin{bmatrix} 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \end{bmatrix} \quad D =$$

2. Find the diameter of the complement of P_5.

$d(\overline{P_5}) =$

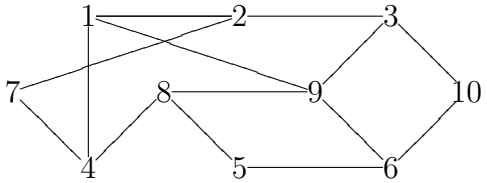
3. Determine if the graph below has Euler walk, or Euler circuit, or neither.



4. Give one example of a complete bipartite graph $K_{m,n}$ which has a Hamilton cycle.

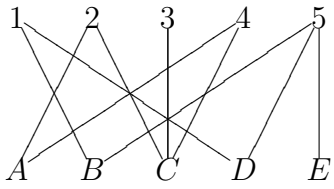
5. Give one example of a cycle C_n which is bipartite.

6. Use 2-coloring to prove that the graph below is bipartite.



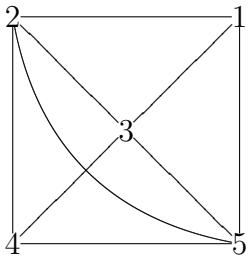
7. Draw the graph in Problem 6 showing the bipartition $V_G = X \cup Y$.

8. Prove that the bipartite graph below has no complete matching.

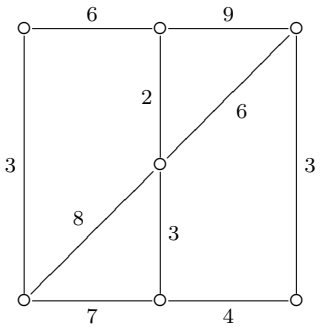


Section B. (4 points each) You must write complete solution.

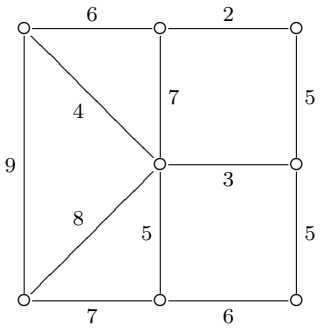
9. Use adjacency matrix to count the number of triangles in the graph below.



10. Solve the Chinese Postman problem for the graph below.



11. Solve the Traveling Salesman problem for the graph below. (Must draw all the Hamilton cycle solutions.)



–Amin Witno