Philadelphia University

Department of Basic Sciences

Exam 2 **Graph Theory** **9–5–2006**

Each problem is worth 4 points.

1. Find a formula for the diameters of $K_n, K_{m,n}, P_n$, and C_n for $n \geq 3$.

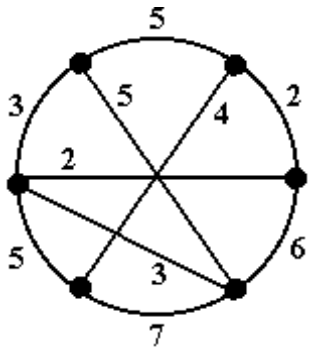
2. Given the incidence matrix I of a graph G, find the adjacency and distance matrices of G.

$$I = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 \end{bmatrix}$$

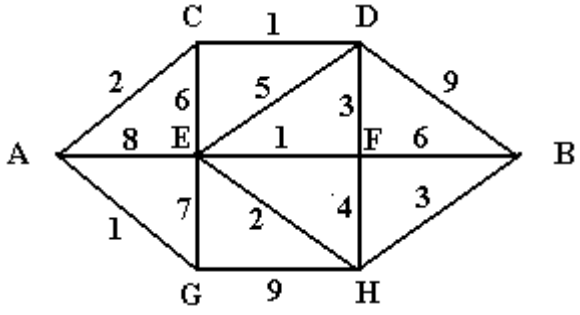
3. Given the adjacency matrix A of G, find the number of triangles contained in G.

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

4. Solve the Chinese Postman Problem for this graph (a) without the weights and (b) with the weights.



5. (a) Use Dijkstra's Algorithm to find the shortest distance from A to B.
   (b) Find two Hamiltonian cycles in the graph and calculate the weights.



–Amin Witno