Math 4322 Quiz II
DeMaio Spring 2009

Name_____

Instructions. Show all your work. Credit cannot and will not be awarded for work not shown. Where appropriate, simplify all answers to a single decimal expansion.

1. (5 points each) Complete the following.

   The graph K_{35} has _____ $\binom{35}{2} = 595$ _____ edges.

   The graph N_{72} has _____ 0 _____ edges.

   The graph P_{42} has _____ 41 _____ edges.

   The graph C_{112} has _____ 112 _____ edges.

   The graph W_{105} has ____ $105 + 105 = 210$ ____ edges.

   The graph W_{105} has _____ 106 _____ vertices.

   The graph $K_{15,17}$ has _____ $15 * 17 = 255$ _____ edges.

   The graph $K_{15,17}$ has _____ $15 + 17 = 32$ _____ vertices.

   The graph $K_{m,n}$ is regular when _____ $m = n$ _____.

   The graph C_n is bipartite when _____ n is even for $n \geq 3$ _____.

   If the degree sequence of a graph G is $4, 3, 3, 2, 2$ then G has _____ 7 _____ edges.
   The Handshaking Lemma states $\sum_{v \in V} \deg(v) = 2e$. So, $2e = 4 + 3 + 3 + 2 + 2 = 14$.
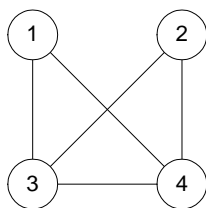   A regular graph of degree four with 10 edges has _____ 5 _____ vertices.
   Let x be the number of vertices in the graph. As in the previous problem, $\sum_{v \in V} \deg(v) = 2e$. So,
   $4x = 2 * 10$ and $x = 5$.

2. (10 points) Represent $K_{1,4}$ with an adjacency matrix.

$$A(K_{1,4}) = \begin{bmatrix} 0 & 1 & 1 & 1 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \end{bmatrix}$$
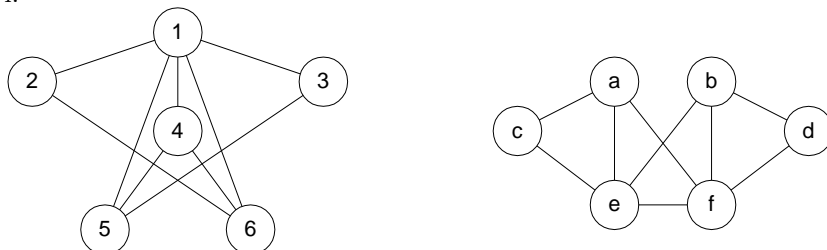
3. (10 points) Draw the graph represented by the adjacency matrix $A(G) = \begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$.
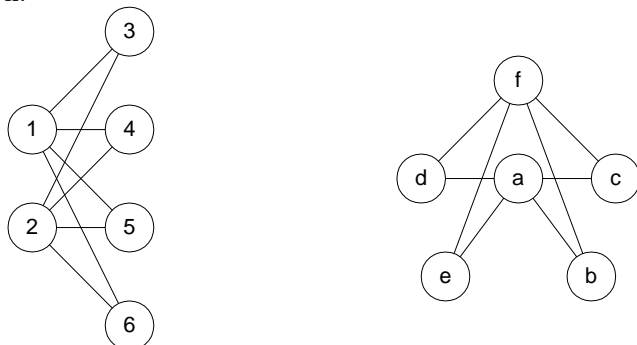
4. (20 points) Determine if the following pairs of graphs are isomorphic. If yes, provide an isomorphic mapping. If no, explain why.

i.

These graphs are not isomorphic. The first graph has a vertex of degree 5 while the second graph has no such vertex.

ii.

These graphs are isomorphic. One possible isomorphism is

n	1	2	3	4	5	6
$\phi(n)$	a	f	b	c	e	d

5. (15 points) Construct all non-isomorphic graphs with $n = 5$ vertices and $e = 3$ edges.