MATH 245 Counting Worksheet 1 Spring

1. Using the letters $ABCDE$:

   (a) How many strings of length 4 can be formed with no repetitions?

   (b) How many strings from part (a) begin with B?

   (c) How many strings from (a) do not begin with B?

2. Use the multiplication principle to show that a set with n elements has 2^n subsets.

3. In how many ways can we select 2 books from different subjects among 5 distinct computer science books, 3 distinct math books and 2 distinct art books?

4. A six person committee composed of A,B,C,D,E and F is to select a chairperson, a secretary and a treasurer:

   (a) In how many ways can this be done?

   (b) In how many ways can this be done if either A or B must be chairperson?

   (c) In how many ways can this be done if E must hold one of the offices?

   (d) In how many ways can this be done if both D and F must hold an office?

MATH 245 Counting Worksheet 2 Spring

1. Using the letters $ABCDEF$:
   (a) How many permutations contain the substring DEF?

   (b) How many permutations contain the substring DEF in any order?

2. In how many ways can 7 women and 5 men wait in line if no 2 men stand together?

3. In how many ways can we select a committee of three from a group of ten people?

4. In how many ways can we select a committee of 2 women and 3 men from a group of 5 women and six men?

5. A deck of cards has 4 suits, clubs, diamonds, hearts and spades, and 13 denominations, ace, 2-10, jack, queen and king:
   (a) How many unordered 5 card poker hands are there?

   (b) How many poker hands contain cards of the same suit?

   (c) How many poker hands contain 3 cards of one denomination and 2 cards of a second denomination?

MATH 245 Graph Theory Worksheet 1 Spring

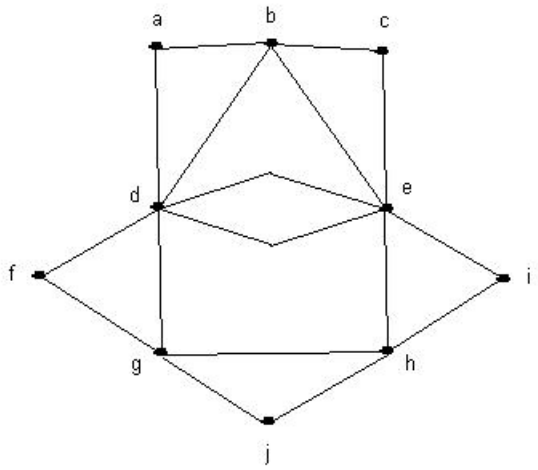
1. Draw a graph with the given properties or explain why none exists.

   (a) 6 vertices each degree 3

   (b) 6 vertices and 4 edges

   (c) A simple graph with 6 vertices having degrees 1,2,3,4,5,5

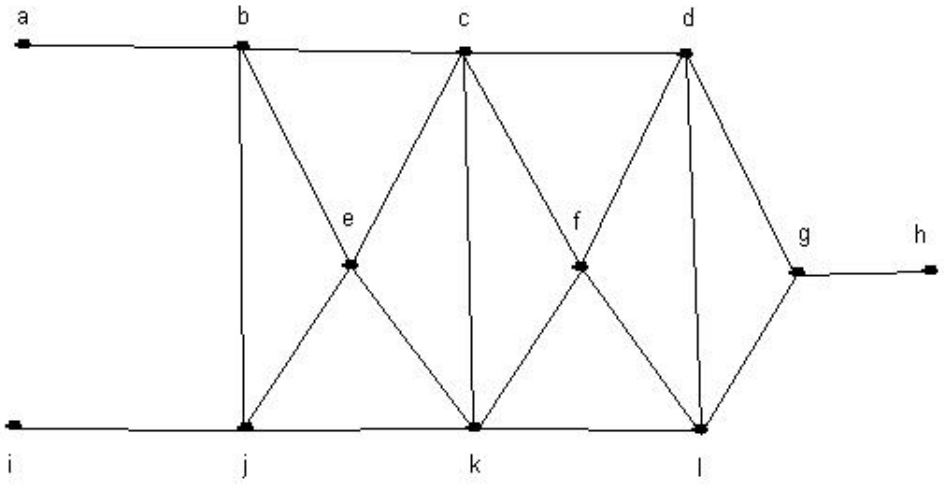
2. Given the following graph, is there an Euler cycle? If so find one.



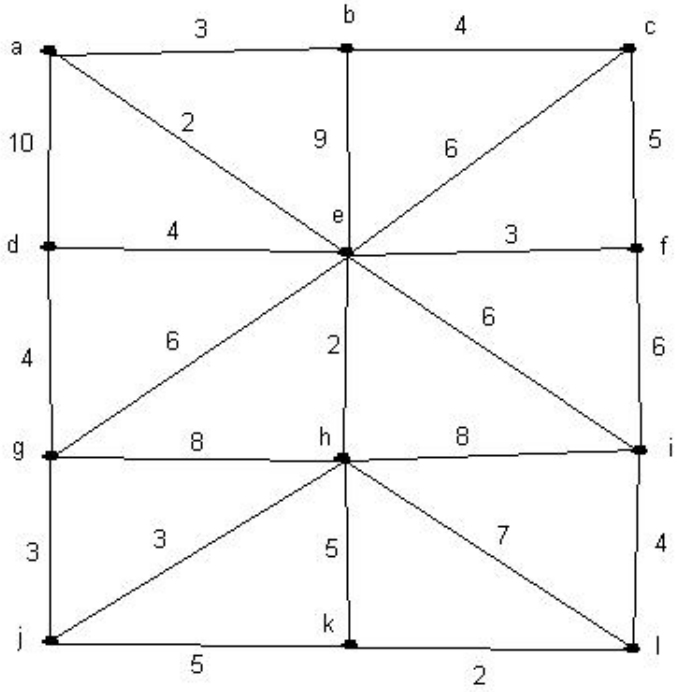
3. Let G be a graph. Define a relation R on the set V of vertices of G as vRw if there is a path from v to w. Prove R is an equivalence relation on V.

MATH 245 Graph Theory Worksheet 2 Spring

1. Find a spanning tree of the following graph.

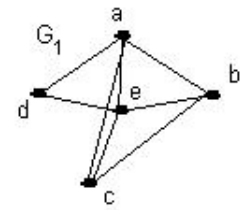


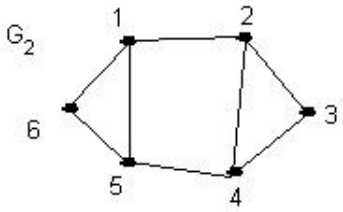
2. Find a minimal spanning tree of the following graph.

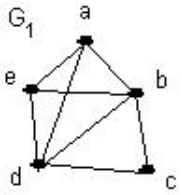


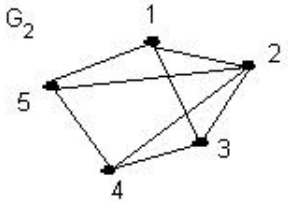
MATH 245 Graph Theory Worksheet 3 Spring

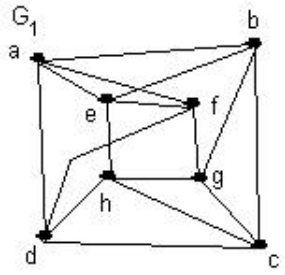
1. For each pair determine if G_1 and G_2 are isomorphic.

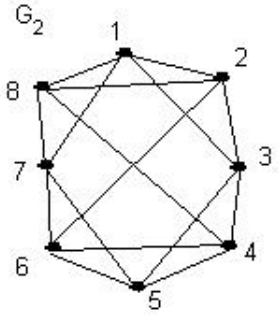












2. Show that G is NOT planar. Try to find $K_{3,3}$