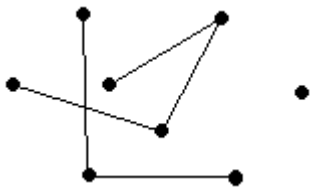
Math 6
Worksheet 9
Due Wednesday June 2nd

Please discuss the following questions with your assigned groups. You may take notes on all items you discuss with your classmates, however you are to write up your solutions independently of one another and without assistance. Your solutions should be written up carefully and neatly on a separate sheet of paper. You should write in **complete sentences** and ***explain all steps taken and tools used (such as theorems or results from class) in reaching your final answers***. Please also include at the top of your write-up a list of people with whom you discussed these problems.

1. How many different five-card poker hands consist of
   a. a straight flush?
   b. a straight (but not a straight flush)?
   c. a flush (but not a straight flush)?

2. Let G be a simple graph with n vertices. If a pair of vertices in G are connected by a path (of any length), are they necessarily connected by a path with n-1 or fewer edges? Why? Is this true for a graph that is not simple?

3. A *connected component* of a graph is a maximal subset of vertices and the edges between them that form a connected subgraph (where by maximal I mean that adding any vertex to the subset would result in a subgraph that is not connected). For example, the following graph has three connected components:



   If a simple graph with 20 vertices has 4 connected components, what are the maximum and minimum numbers of edges it can have? Why?

4. Give a valid argument to conclude $\sim q$ from the following hypotheses:

   i. $\sim p \vee q \rightarrow r$
   ii. $s \vee \sim q$
   iii. $\sim t$
   iv. $p \rightarrow t$
   v. $\sim p \wedge r \rightarrow \sim s$

5. Give a valid argument to conclude $\sim t \vee q$ from the following hypotheses:

i. $\sim p \rightarrow \ \sim s \wedge r$
ii. $t \rightarrow s$
iii. $u \rightarrow \sim p$
iv. $u \vee w$
v. $\sim w$