Precalculus
9.2 Assignment

Please do all work ON A SEPARATE SHEET OF PAPER!

1. Compute the following:
   a) $\binom{5}{3}$ 10 b) $\binom{8}{2}$ 28 c) $\binom{10}{4}$ 210 d) $\binom{1293}{1292}$ 1293

2. What is $\binom{n}{0}$ for any positive integer n? Why?

3. What is $\binom{n}{1}$ for any positive integer n? Why?

4. What is $\binom{n}{n}$ for any positive integer n? Why?

5. Does $\binom{5}{7}$ make any sense? Why or why not?

6. Compute the following:
   a) $\binom{6}{2}$ and $\binom{6}{4}$ b) $\binom{8}{3}$ and $\binom{8}{5}$

7. Make a guess about a general rule for combinations that is suggested by your solutions to #6. Why is this?

8. a) In how many ways can I choose 4 different officers from a club of 20 people? 116,280
   b) In how many ways can I choose a 4-person committee from a club of 9 people? 126

9. My club has 25 members. In how many ways can I choose members to form a 3-person committee? 2300

10. Our water polo team has 15 members. I want to choose a starting line-up consisting of 7 players, one of whom will be the goalie (the other 6 positions are interchangeable). In how many ways can I choose my starting line-up? 45045

11. The Senate has 100 members, consisting of 55 Republicans and 45 Democrats. In how many ways can I choose a 5-person committee consisting of 3 Republicans and 2 Democrats? 259726 50

12. A girl's volleyball team has 14 players, including a set of triplets: Alicia, Amanda, and Anna. In how many ways can we choose 6 starters:
   a) with no restrictions? 3003
   b) if all 3 triplets are in the starting line-up? 165
   c) if *exactly* 1 of the triplets is in the starting line-up? 1386
   d) if *at most* one of the triplets is in the starting line-up? 1848

13. Suppose you draw at random 5 cards from a standard 52-card deck.
   a) How many possible different 5-card hands are there? 2,598,960
   b) How many ways can you draw 5 cards such that you get exactly 1 ace? 778,320
   c) How many ways can you pull 5 cards such that you get exactly 2 aces and 3 kings? 24

14. A coin is flipped 8 times where each flip comes up either heads or tails. How many possible outcomes
   a) are there in total? 256
   b) contain *exactly* 3 heads 56
   c) contain *at least* 3 heads 219
   d) contain the same number of heads and tails 70