Title: Math 017 Quiz #5, Range 8.1-8.3 Name____________________

1. Calculate the following

   (a) $P(5,3)$ (3pt)

   (b) $\begin{pmatrix} 5 \\ 3 \end{pmatrix}$. (3pt)

   Solution:

   (a) $P(5,3) = 5 \times 4 \times 3 = 60$
   Or you can do

$$P(5,3) = \frac{5!}{(5-3)!} = \frac{5 \times 4 \times 3 \times 2 \times 1}{2 \times 1} = 60;$$

   (b) $\begin{pmatrix} 5 \\ 3 \end{pmatrix} = \frac{5 \times 4 \times 3}{3 \times 2 \times 1} = \frac{60}{6} = 10.$
   Or

$$\begin{pmatrix} 5 \\ 3 \end{pmatrix} = \frac{5!}{(5-3)!3!} = \frac{5 \times 4 \times 3 \times 2 \times 1}{(2 \times 1) \times (3 \times 2 \times 1)} = 10.$$

2. A box contain 5 red balls, 3 green balls and 1 black ball. 2 balls are drawn randomly without replacement.

   (a) Find the probability that 1 red and 1 green ball are drawn.(2pts)

   (b) Find the probability that none of these two balls is black.(2pts) (Hint: use complement rule, find the probability that one of them is black first.)

   Solution: The total possible ways to select 2 balls from the box is

$$\binom{9}{2} = \frac{9 \times 8}{2 \times 1} = 36.$$

   (a) By multiplication principle, the total number of possible ways to select 1 red ball and 1 green ball is $5 \times 3 = 15$. Therefore,

$$P(1 \text{ red and } 1 \text{ green}) = \frac{15}{36} = \frac{5}{12}.$$

   (b) Notice the total number of possible ways to select 1 black ball and 1 OTHER ball is $1 \times 8 = 8$. Thus,

$$P(1 \text{ black and } 1 \text{ other}) = \frac{8}{36} = \frac{2}{9}.$$

   Therefore,

$$P(\text{NO black ball}) = 1 - \frac{2}{9} = \frac{7}{9}.$$

   NOTE: you can also solve this problem by tree diagram.