Pre-Calculus 10-1 & 10-5 Extra Practice   Name_____

1) Evaluate $_{10}C_5$. Show your work, using the formula, then check your answer with a calculator.

$$\frac{_{10}P_5}{5!} \quad \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \frac{30240}{120} = \boxed{252}$$

2) Evaluate $_8C_3$. Show your work, using the formula, then check your answer with a calculator.

$$\frac{_8P_3}{3!} = \frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1} = \frac{336}{6} = \boxed{56}$$

3) At an ice cream shop, customers are offered a selection of 3 different cones and 8 different flavors of ice cream. In how many ways can 2 cones and 5 flavors be chosen?

$$_3C_2 \cdot {_8C_5} = 3 \cdot 56 = \boxed{168}$$

4) In a study hall, there are 13 freshmen, 12 sophomores, and 8 juniors. In how many ways can 5 freshmen, 6 sophomores and 3 juniors be chosen to go to the library?

$$_{13}C_5 \cdot {_{12}C_6} \cdot {_8C_3} = 1287 \cdot 924 \cdot 56$$

$$= \boxed{66594,528}$$

5) From a deck of 52 cards, 3 are drawn. What is the probability that all 3 cards are Jacks?

$$\frac{_4C_3}{_{52}C_3} = \frac{4}{22100} = \boxed{1.81 \times 10^{-4} = 0.000181 \\ = 0.0181 \, \%}$$

6) A bag of candy contains 15 Smarties and 25 Dum Dums. If 10 pieces are picked out, what is the probability that exactly 4 are Smarties and 6 are Dum Dums?

$$\frac{_{15}C_4 \cdot {_{25}C_6}}{_{40}C_{10}} = \frac{1365 \cdot 177,100}{847,660,528} = \boxed{\frac{241,741,500}{847,660,528} \\ = 0.285 \\ = 28.5\%}$$

7) Suppose that the probability of a pen being defective is 4%. What is the probability that 8 pens are defective in a box of 75 pens?

Defective = 4%   Not Defective = 96%

$$75C_8 \ (0.04)^8 \ (0.96)^{67} = \boxed{\begin{array}{l} 0.00717 \\ = 0.717 \% \end{array}}$$

8) Suppose that the probability of a heart pacemaker working flawlessly for one year is 0.89. What is the probability that three patients out of five receiving pacemakers this week will have some kind of problem with their pacemakers over the next year?

Flawless = 0.89   Problem = 0.11

$$5C_3 \ (0.11)^3 \ (0.89)^2 = \boxed{\begin{array}{l} 0.0105 \\ = 1.05 \% \end{array}}$$

9) Suppose a quiz has 8 multiple-choice questions, each with 5 choices. If a student guesses randomly on every question, what is the probability the student will get 5 or more correct?

Correct $= \frac{1}{5} = 0.2$ wrong $= \frac{4}{5} = 0.8$

$$8C_5 \ (0.2)^5 (0.8)^3 + 8C_6 (0.2)^6 (0.8)^2 + 8C_7 (0.2)^7 (0.8)^1$$
$$+ \ 8C_8 \ (0.2)^8 (0.8)^0 = \boxed{\begin{array}{l} 0.0104 \\ = 1.04\% \end{array}}$$

10) Suppose that a true-false quiz has 10 questions. If a student answers all questions by randomly guessing, what is the probability that at least 6 questions are answered correctly?

Correct $= 0.5$ wrong $= 0.5$

$$10C_6 \ (0.5)^6 (0.5)^4 + 10C_7 (0.5)^7 (0.5)^3 + 10C_8 (0.5)^8 (0.5)^2$$
$$+ \ 10C_9 (0.5)^9 (0.5)^1 + 10C_{10} (0.5)^{10} (0.5)^0 = \boxed{\begin{array}{l} 0.377 \\ = 37.7 \% \end{array}}$$