No calculators 31 points

Per: _ 7

Where applicable, express your answers in permutation, combination, and/or factorial notation. No need to evaluate to a number.

- 1. Ms. Tantod asks her son to organize his books on one of his bookshelves by genre. He owns 6 different graphic novels, 4 different "I Survive Books," and 2 different Star Wars books. How many ways can he line them up if...[2 each]
 - a. There are no restrictions?



b. He only has room on the shelf for 4 books?

c. He has room for all 12, but wants to keep the books of the same genre together?

- 2. Mr. Hahn is making a computer password with letters and single-digit numbers. [1 each]
 - a. How many different 6-character passwords are possible?

b. How many different 6-character passwords are possible if the password starts with 4 letters and ends with 2 single-digit numbers, and letters and single-digit numbers may be repeated?

- 3. A family of six are going to dinner (Mom, Dad, and 4 kids). In how many ways...
 - a. Can they stand in line, waiting to be seated, if Mom has to stand in front and Dad has to stand in back (to make sure no one fights)? [2 pts]



b. Can they sit around the circular table?[1 pt]



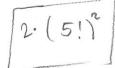
c. Can they sit around the circular table, if Mom and Dad have to sit next to each other?[2 pts]



4. How many different distinguishable 12-letter "words" can be spelled using all 12 letters from HIPPOPOTAMUS? [2 pts]



5. Five boys and five girls are to juggle in a contest judged by Mrs. Hlasek. Each contestant has one opportunity to perform. If boys and girls must alternate, how many arrangements of jugglers are possible?[2 pts]



- 6. The football team at UCLA played 12 games last year, winning 5, losing 4, and tying 3. How many different ways is this possible? [2pts] $\binom{12}{5}\binom{7}{4}$
- 7. You are invited to an ice cream social. How many ways are there to make a 2-scoop ice cream bowl out of 10 flavors, if you are allowed to repeat flavors (e.g. you can have a double scoop of vanilla) and you don't care what order the scoops are in? [2 pts] (10)+(10)
- 8. A hot dog stand has 6 different toppings. Assuming the order of the toppings is not important to you, how many different hot dogs can be made with: (**for this problem, please give your answer as a single number)
 - a) Any amount of toppings (including zero)? [2 pts]
 - b) At least 2 toppings? [2 pts] 26-(6)-(1):64-1-6=(57)
- 9. Find the 15th term of the binomial expansion $(-x^3 + 5y^2)^{40}$. You can leave your answer in terms of choose numbers and/or exponents – no need to simplify. [3 pts]

10. Find the constant term for $\left(x^2 + \frac{3}{x}\right)^6$ (the term that, when simplified, is a coefficient multiplied by x^0) [3 pts]

$$\begin{array}{c}
2a - b = 0 \\
a + b = 6
\end{array}$$

$$\begin{array}{c}
3^{4}, \begin{pmatrix} 6 \\ 2 \end{pmatrix} \\
a = 2 \\
b = 4
\end{array}$$