Analysis H 2022-2023– Hahn/Hlasek/Tantod
Unit 2: Probability - Quiz 1
No calculators

31
31 points

Justin Oh will probably do well on this quiz

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?

   $12!$

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

   $\binom{12}{4} \cdot 4!$

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

   $3! \cdot 6! \cdot 4! \cdot 2!$

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?

   $(10+26)^6 = 36^6$

   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?

   $26^4 \cdot 10^2$

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]

   $4!$

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

   $5!$

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

   $2 \cdot 4!$

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

$$\frac{12!}{3! \cdot 2!}$$

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]

$$2 \cdot (5!)^2$$

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]

$$\binom{10}{2} + \binom{10}{1}$$

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]

   $2^6 = 64$

   b) At least 2 toppings? [2 pts]

   $2^6 - \binom{6}{0} - \binom{6}{1} = 64 - 1 - 6 = 57$

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]

$$+\left[x^{78} y^{28} \cdot \binom{40}{14} \cdot 5^{14}\right]$$

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]

$2a - b = 0$
$a + b = 6$
$a = 2$
$b = 4$

$$3^4 \cdot \binom{6}{2}$$

-0