

## Quiz 20201030 Solution

Name:

School ID:

(You don't have to compute a final number for your answer.)

1. (5%) How many arrangements of **JUPITER** are there with the vowels occurring in alphabetic order?

**Solution:**  $\frac{7!}{3!}$

2. (5%) How many arrangements of six 0s, five 1s, and four 2s are there where the first 0 precedes the first 1?

**Solution:**

Note that before the first 0, there must be only 2s, so the first 0 can only be at position 1,2,3,4,5 since there are only four 2s.

- The position of the first 0 is 1:  $\frac{14!}{5!5!4!}$
- The position of the first 0 is 2:  $\frac{13!}{5!5!3!}$
- The position of the first 0 is 3:  $\frac{12!}{5!5!2!}$
- The position of the first 0 is 4:  $\frac{11!}{5!5!}$
- The position of the first 0 is 5:  $\frac{10!}{5!5!}$

So the total number is  $\frac{14!}{5!5!4!} + \frac{13!}{5!5!3!} + \frac{12!}{5!5!2!} + \frac{11!}{5!5!} + \frac{10!}{5!5!}$

3. (5%) How many 8-digit numerical sequences are there involving exactly six different digits?

**Solution:**

There are  $\binom{10}{6}$  sets of six different digits. Any set of six different digits can create  $6 \times \frac{8!}{3!} + \binom{6}{2} \frac{8!}{2!2!}$  sequences.

So the total number is  $\binom{10}{6} \times (6 \times \frac{8!}{3!} + \binom{6}{2} \frac{8!}{2!2!})$