Math 112 - Quiz 11

November 23, 2017

Name __Key__

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) The letters of the English alphabet are used to form a 3-letter code.

   (a) How many possible codes are there if letters cannot be reused?

   $$26 \times 25 \times 24 = \boxed{15,600}$$

   (b) How many possible codes are there if letters can be reused?

   $$26 \times 26 \times 26 = \boxed{17,576}$$

2. (2 points) Carl's phone number is 312–663–0266. How many different "telephone numbers" can be formed using all of the digits of Carl's number? (The numbers don't have to be valid telephone numbers—they just have to have the correct form!)

$$\frac{10!}{2!\,2!\,4!} = \frac{\overset{5}{\cancel{10}} \times 9 \times 8 \times 7 \times \overset{3}{\cancel{6}} \times 5}{\cancel{2} \times 1 \times \cancel{2} \times 1} = \boxed{37,800}$$

3. (3 points) Compute each of the following.

   (a) $8! = 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

   $$= \boxed{40,320}$$

   (b) $\dfrac{200!}{197!} = \dfrac{200 \times 199 \times 198 \times 197!}{197!} = 200 \times 199 \times 198 = \boxed{7,880,400}$

   (c) $\dfrac{25!}{5!\,20!} = \dfrac{\overset{5}{\cancel{25}} \times \cancel{24} \times 23 \times 22 \times 21 \times \cancel{20!}}{\cancel{5} \times \cancel{4} \times \cancel{3} \times \cancel{2} \times 1 \quad \cancel{20!}} = 5 \times 23 \times 22 \times 21$

   $$= \boxed{53,130}$$

4. (2 points) List two different permutations of (a, b, c, d, e). How many different permutations are there?

$$(a, b, c, e, d)$$

$$(b, c, d, e, a)$$

$$5! = 5 \times 4 \times 3 \times 2 \times 1$$

$$= \boxed{120}$$