Subject: Discrete Structure (SECI 1013)

No.

Date.

Tutorial 2 (Chapter 3)

1. Consider 3-digit number whose digit are ~~eig~~ either 2, 3, 4, 5, 6 or 7.

a) How many numbers are there?

b) How many numbers are there if the digits are instinct?

c) How many numbers between 300 to 700 is only odd digits allow?

2, 3, 4, 5, 6, 7 — 6 num

a) _ _ _

6	6	6
↓	↓	↓
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7

Each digit can be fill with 6 numbers

$6 \times 6 \times 6 = 216$

b) $\underline{6}$ $\underline{5}$ $\underline{4}$

Each digit can not be repeated

$6 \times 5 \times 4 = 120$

c) _ _ _

3	2	3
4	3	5
5	4	7
6	5	
	6	
	7	

$4 \times 6 \times 3 = 72$

CAMPAP

Subject...... Date......

2. Anita invited 10 of her friends, a couple, four men and four women to her anniversary dinner, how many ways Anita can arrange them around a round dinner table

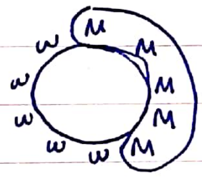
a. Men insist to sit next to each other

b. The couple insisted to sit next to each other

c. Men and women sit in alternate seat

d. Before her friend left, Anita want to arrange a photoshoot. How many ways can her photographer arrange in a row, if Anita and her husband stand next to each other.

a. 5 men and 5 wowen

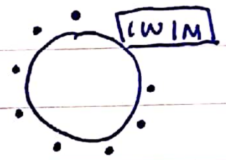


$(6-1)! \times 5!$

$= 5! \times 5!$

$= 14400$ ways

b. couple sit next to each other

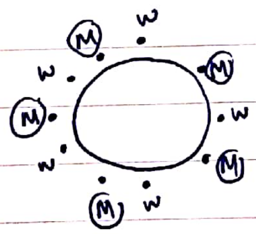


$(9-1)! \times 2!$

$= 8! \times 2!$

$= 80640$ ways

c.



$(5-1)! \times 5!$

$= 4! \times 5!$

$= 2880$ ways

d. $\boxed{\text{Anita + Husband}}$ 2 3 4 5 6 7 8 9 10 11

1

$11! \times 2! = 79833600$ ways

No ....

Date.........................

Subject.........................

3. In a ~~sh~~ school sport day, five sprinters are competing in a 100 meter race. How many ways are there for sprinter to finish

a) If no ties

b) Two sprinters tie

c) Two group of two sprinters tie

a) $\underline{\ }\ \underline{\ }\ \underline{\ }\ \underline{\ }\ \underline{\ }$ $= 5!$

$5\ \ 4\ \ 3\ \ 2\ \ 1$ $= 120$ ways

b) $\underline{\ }\ \underline{\ }\ \underline{\ }\ \underline{\ }$ $n = 5,\ r = 2$

2 ${}^{n}C_{r}$

${}^{5}C_{2} = 10$

$10 \times 4!$

$= 240$ ways

c. $\underline{\ }\ \underline{\ }\ \underline{\ }$

$2\ \ 2$

${}^{5}C_{2} \times {}^{3}C_{2} \times 3!$

$= 180$ ways

Subject

4. A croissant shop has plain croissants, cherry croissants, chocolate croissants, almond croissants, apple croissants, and broccoli croissants. How many ways are there to choose

a. a dozen croissants?

b. two dozen croissants with at least two of each kind?

c. two dozen croissants with at least five chocolate croissants and at least three almond croissants?

a. $n = 6,\ r = 12$ (dozen)

$$C(n+r-1, r) = \binom{n+r-1}{r} = \frac{(n+r-1)!}{r!(n-1)!}$$

$$C(6+12-1, 12) = \binom{6+12-1}{12} = \frac{(6+12-1)!}{12!(6-1)!}$$

$$= \frac{17!}{12! \times 5!}$$

$$= 6188 \text{ ways}$$

b. $n = 6 \quad r = 12 \times 2 = 24$ (2 dozen)

$r = 24 - (6 \times 2) = 12$

*at least two of each kind

Plain = 2
Cherry = 2
Chocolate = 2
Almond = 2
Apple = 2
Broccoli = 2

$$C(n+r-1, r) = \binom{n+r-1}{r} = \frac{(n+r-1)!}{r!(n-1)!}$$

$$C(6+12-1, 12) = \binom{6+12-1}{12} = \frac{(6+12-1)!}{12!(6-1)!}$$

$$= \frac{17!}{12! \times 5!}$$

$$= 6188 \text{ ways}$$

Subject...................................... Date......................

c) $n = 6$, $r = 2 \times 12 = 24$ (2 dozens)

$24 - (5+3)$ * at least 5 chocolate

at least 3 almond

$r = 16$

$$C(6+16-1, 16) = \frac{(6+16-1)!}{16!\,(6-1)!} = \frac{21!}{16! \times 5!}$$

$= 20349$ ways