

Q5

a) i. $(5-1)! = 24$

ii. $3! \times (3-1)! = 12$

b) All ways $= 5! = 120$

Head next to assistant $= 2! \times 4! = 48$

Head not next to assistant $= 120 - 48$
 $= 72$ ways

c) i) $C(n+r-1, r)$ - no restriction

$$n=10$$

$$r=6$$

$$C(15, 6) = \frac{(10+6-1)!}{6!(10-1)!}$$
$$= 5005$$

ii) atleast 4 hazelnut (H)

- 4H, $(n=9, r=2)$

$$C(9+2-1, 2) = \frac{(9+2-1)!}{2!(9-1)!}$$
$$= 42$$

- 5H $(n=9, r=1)$

$$C(9+1-1, 1) = \frac{(9+1-1)!}{1!(9-1)!}$$
$$= 9$$

- 6H $(n=9, r=0)$

$$C(9+0-1, 0) = \frac{(9+0-1)!}{0!(9-0)!}$$
$$= 1$$

$$42+9+1 = 55 \text{ ways}$$

iii) all diff type choc (no repeat)

$$n=10$$

$$r=6$$

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

$$= \frac{10!}{6!4!}$$

$$= 210 \text{ ways}$$



For a football match, there are thirteen players that show up to play for the next game.

- How many ways are there to choose 11 players to take start the game? (1 mark)
- How many ways are there to assign 11 positions from the pool of 13 players?
(1 mark)
- Three players from 13 that showed up are woman. How many ways to choose 11 players to start the game if at least one player must be a woman? (4 marks)

$$d) (i) {}^{13}C_{11} = 78$$

$$(ii) {}^{13}P_{11} = 3113510400$$

$$(iii) {}^3C_1 \times {}^{10}C_{10} + {}^3C_2 \times {}^{10}C_9 + {}^3C_3 \times {}^{10}C_8 = 78$$

$$\text{men} = 13 - 3 = 10$$

$$\text{women} = 3$$