Home work

Q1)

A) Different ways of picking 8 combinations from 4 tiles

$n = 4$

$r = 8$

$^{r+(n-1)}C_{n-1}$

$^{8+(4-1)}C_{4-1} = {}^{11}C_3 = \dfrac{11!}{3! \cdot (11-3)!} = \boxed{165}$

Answer: 165

B) Pick at least 4 green tiles and exactly 1 blue tile for picking 8 tiles

B G G G G _ _ _

$$\_\ \_\ \_\ \_\ \underbrace{\_\ \_\ \_}_{3}$$

We can pick either Green, Blue or Red tiles for the remaining 3 places.

$n = 3$

$r = 3$

$$^{3+(3-1)}C_{3-1} = {}^{5}C_{3}$$

$$^{5}C_{3} = \frac{5!}{3!\,(5-3)!} = 10$$

Answer: $\underline{\underline{10 \text{ ways}}}$

c) Picking 8 tiles where Red tiles are always greater than green tiles.

<u>Case 1:</u> $G = 0$

$R = 1$

$B / Y / R = 7$

$r = 7$

$n = 3$ (Red, yellow or blue)

$$^{7+(3-1)}C_{3-1} = {}^{9}C_{2}$$

<u>Case 2:</u> $G = 1$, $R = 2$, $B | Y | R = 5$

$r = 5$ $n = 3$ $$^{5+(3-1)}C_{3-1} = {}^{7}C_{2}$$

<u>Case 3:</u> $G = 2$, $R = 3$, $B | Y | R = 3$

$r = 3$ $n = 3$

$$^{3+(3-1)}C_{3-1} = {}^{5}C_{2}$$

Case 4: $G = 3$, $R = 4$, $B | Y | R = 1$

$r=1, \quad n=3$

$$1+(3-1)C_{3-1} = {}^{3}C_{2}$$

Now adding the combination from all the cases:

$${}^{9}C_{2} + {}^{7}C_{2} + {}^{5}C_{2} + {}^{3}C_{2}$$

$$\frac{9!}{2!\cdot 7!} + \frac{7!}{2!\cdot 5!} + \frac{5!}{2!\cdot 3!} + \frac{3!}{2!\cdot 1!}$$

i.e $36 + 21 + 10 + 3 = 70$

<u>Answer:</u> There are 70 <u>ways</u>

Question 2:

75, 76, 81, 82, 83, 84, 85, 86, 87, 88, 88,
88, 89, 90, 91, 92, 92, 94

Mean: $\bar{X} = \frac{1}{n} \sum_{j=1}^{n} X_j$

$= 85.4$

Median: $\frac{86+87}{2} = 86.5$

Mode: 88

Range: $94 - 75 = 19$

IQR : $Q_3 - Q_1$

$89.5 - 81.5$

$= 8$

Variance : $\sigma^2 = \frac{1}{n} \sum_{j=1}^{n} (x_j - \bar{x})^2$

$= 29.04$

Standard Deviation : $\sigma = \sqrt{\frac{1}{n} \sum_{j=1}^{n} (x_j - \bar{x})^2}$

$= 5.38$