Homework 2

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Question 1.

4 types of tiles. → $n=4$
pick 8 with replacement & order doesn't matter
→ $k=8$

A. How many different options do you have for picking 8?

$$r+(n-1)C_{(n-1)} = 8+3C_3 = {}_{11}C_3$$
$$= \frac{11!}{3!\,8!} = \frac{11\cdot 10^{5}\cdot 9^{3}}{3\cdot 2\cdot 1} = \boxed{165}$$

B. pick at least 4 green tiles and exactly 1 blue.

Total : 165.

G G G G B [G, R, B] [ ] [ ] [ ]

⇒ Since there are at least 4 Greens and exactly one blue, let's say there are exactly 4 Green and 1 Blue tiles.

The rest 3 tiles can be anything but blue.

⇒ $3+3-1C_{3-1} = 5C_2 = \boxed{10}$

C. Pick 8 tiles : $n(R) > n(G)$

1. Red : 1 G : 0 ⇒ $n=7$ $k=2$ ⇒ $2+7-1C_{n-1}$
   * (1 red, 7 spots remaining, 2 colors to choose) = $8C_6 = 28$
2. Red : 2 G : 0 ⇒ $n=6$ $k=2$ = $7C_5 = 21$
3. Red : 2 G : 1 ⇒ $n=5$ $k=2$ = $6C_4 = 15$
4. Red : 3 G : 0 ⇒ $n=5$ $k=2$ = $\prime\prime$ = 15

5. Red : 3 G : 1 ⇒ n=4 k=2 = $_5C_3$ = 10
6. Red : 3 G : 2 ⇒ n=3 k=2 $_4C_2$ = 6
7. Red : 4 G : 0 ⇒ n=4 k=2 $_5C_3$ = 10
8. Red : 4 G : 1 ⇒ n=5 k=2 = 15
9. Red : 4 G : 2 ⇒ n=2 k=2 $_3C_1$ = 3
10. Red : 4 G : 3 ⇒ n=1 k=2 = 2
11. Red : 5 G : 0 ⇒ n=3 k=2 = 6
12. Red : 5 G : 1 ⇒ 3
13. Red : 5 G : 2 ⇒ 2
14. Red : 5 G : 3 ⇒ 1
15. Red : 6 G : 0 ⇒ 3
16. Red : 6 G : 1 ⇒ 2
17. Red : 6 G : 2 ⇒ 1
18. Red : 7 G : 0 ⇒ 2
19. Red : 7 G : 1 = 1
20. Red 8 G : 0 = 1

⇒ If we sum up all the options, we get 147

Question 2.

A = [82, 88, 76, 88, 92, 78, 89, 91, 85, 87, 94, 75, 81, 90, 83, 86, 88, 92, 79, 84]

1. Mean = $\frac{\Sigma A}{20}$ = 85.40
2. Median = Between 86, 87 ⇒ 86.50
3. Mode = 88
4. Range = 94 − 75 = 19
5. IQR ⇒ 75% (Q3) = 89.25 ∴ $Q_3 - Q_1$ = 89.25 − 81.75
   25% (Q_1) = 81.75 = 7.5
6. $\sigma^2 = \frac{1}{n}\sum_{j=1}^{n}(x_j - \bar{x})^2$
   $= \frac{1}{20}\left[(82-85.4)^2 + (88-85.4)^2 + \cdots (84-85.4)^2\right]$
   = 29.04
7. Sd = $\sqrt{29.04}$ = 5.39