

Homework 2

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Question 1.

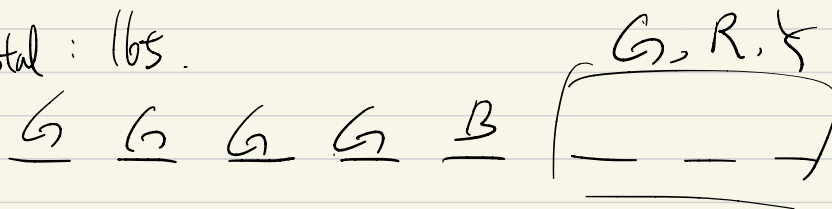
4 types of tiles. $\rightarrow n=4$
pick 8 with replacement & order doesn't matter
 $\rightarrow k=8$

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

$$\begin{aligned} r + (n-1)C_{n-1} &= 8 + 3C_3 = 11C_3 \\ &= \frac{11!}{3!8!} = \frac{11 \cdot 10 \cdot 9}{2 \cdot 2 \cdot 1} = 165 \end{aligned}$$

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

Total: 165.



\Rightarrow 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.

$$\Rightarrow 3+3-1C_{3-1} = 5C_2 = 10$$

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

1. Red: 1 G: 0 $\Rightarrow n=7$ $k=2 \Rightarrow 2+7-1C_{7-1}$
* (1 red, 7 spots remaining, 2 colors to choose) $= 8C_6 = 28$

2. Red: 2 G: 0 $\Rightarrow n=6$ $k=2 = 7C_5 = 21$

3. Red: 2 G: 1 $\Rightarrow n=5$ $k=2 = 6C_4 = 15$

4. Red: 3 G: 0 $\Rightarrow n=5$ $k=2 = 11 = 15$

$$5. \text{Red: } 3 \quad G: 1 \Rightarrow n=4 \quad k=2 = {}^5C_2 = 10$$

$$6. \text{Red: } 3 \quad G: 2 \Rightarrow n=3 \quad k=2 = {}^4C_2 = 6$$

$$7. \text{Red: } 4 \quad G: 0 \Rightarrow n=4 \quad k=2 = {}^5C_2 = 10$$

$$8. \text{Red: } 4 \quad G: 1 \Rightarrow n=5 \quad k=2 = 15$$

$$9. \text{Red: } 4 \quad G: 2 \Rightarrow n=2 \quad k=2 = {}^3C_1 = 3$$

$$10. \text{Red: } 4 \quad G: 3 \Rightarrow n=1 \quad k=2 = 2$$

$$11. \text{Red: } 5 \quad G: 0 \Rightarrow n=3 \quad k=2 = 6$$

$$12. \text{Red: } 5 \quad G: 1 \Rightarrow 3$$

$$13. \text{Red: } 5 \quad G: 2 \Rightarrow 2$$

$$14. \text{Red: } 5 \quad G: 3 \Rightarrow 1$$

$$15. \text{Red: } 6 \quad G: 0 \Rightarrow 3$$

$$16. \text{Red: } 6 \quad G: 1 \Rightarrow 2$$

$$17. \text{Red: } 6 \quad G: 2 \Rightarrow 1$$

$$18. \text{Red: } 7 \quad G: 0 \Rightarrow 2$$

$$19. \text{Red: } 7 \quad G: 1 \Rightarrow 1$$

$$20. \text{Red: } 8 \quad G: 0 \Rightarrow 1$$

\Rightarrow If we sum up all the options,
we get 147

Question 2.

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

$$1. \text{Mean} = \frac{\sum A}{20} = \boxed{85.40}$$

$$2. \text{Median} = \text{Between } 86, 87 \Rightarrow \boxed{86.50}$$

$$3. \text{Mode} = \boxed{88}$$

$$4. \text{Range} = 94 - 75 = \boxed{19}$$

$$5. \text{IQR} \Rightarrow \begin{aligned} 75\% (Q_3) &= 89.25 \\ 25\% (Q_1) &= 81.75 \end{aligned} \quad \therefore Q_3 - Q_1 = 89.25 - 81.75 = \boxed{7.5}$$

$$6. \sigma^2 = \frac{1}{n} \sum_{j=1}^n (x_j - \bar{x})^2$$

$$= \frac{1}{20} [(82 - 85.4)^2 + (88 - 85.4)^2 + \dots + (84 - 85.4)^2]$$

$$= \boxed{29.04}$$

$$7. \text{sd} = \sqrt{29.04} = \boxed{5.39}$$