

# HW 1

Monday, August 31, 2020 9:42 PM

**1:**

a)

$$S = \{RRS, RLS, RSR, RSL, RSSS, SRR, SRL, SRSS, SLR, SLSS, SLL, SSRS, SSSR, SSSL, SSSSS, SSLS, LRS, LLS, LSL, LSSS, LSR\}$$

**Answer:** There are 21 outcomes

b)

$$\text{Answer: } A = \{RRS, SRR, SRL, SRSS, LRS\}$$

c)

$$\text{Answer: } B = \{RLS, RSL, SRL, SLR, LRS, LSR\}$$

d)

$$B^c = \{RRS, RSR, RSSS, SRR, SRSS, SLSS, SLL, SSRS, SSSR, SSSL, SSSSS, SSLS, LLS, LSL, LSSS\}$$

$$\text{Answer: } A \cap B^c = \{RRS, SRR, SRSS\}$$

e)

$$X = \{x \mid x \in \{[0, 4], [0, 2], [1, 3], [1, 5], [2, 4], [3, 5]\}\}$$

**2:**

a)

To order 7 objects you do the factorial

**Answer:** 7!

b)

Creating a 3 person team implicitly creates a 4 person team thus you do 7 choose 3

$$\text{Answer: } \binom{7}{3}$$

c)

We can think of the 4 person team having 2 spots reserved for both Vanya and Allison. Thus we choose 2 slots from 4 from the 7 choose 4 teams.

$$\text{Answer: } \binom{4}{2} \div \binom{7}{4} = \frac{6}{35}$$

d)

Same as before we just are now choosing 4 people from 6 remaining members.

$$\text{Answer: } \binom{4}{2} \div \binom{6}{4} = \frac{6}{15}$$

3:

a)

$$P(\text{Feature}) = P(\text{crime}) * P(\text{feat}|\text{crime}) + P(\text{scifi}) * P(\text{feat}|\text{scifi}) + P(\text{comedy}) * P(\text{feat}|\text{comedy})$$

$$P(\text{Feature}) = 0.44$$

**Answer:**  $P(\text{Feature}) = 0.44$  We use the Law of total probability

b)

$$P(\text{crime}|\text{feature}) = \frac{P(\text{feature}|\text{crime})P(\text{crime})}{P(\text{feature})} = \frac{0.6(0.5)}{0.44} = \frac{0.3}{0.44}$$

**Answer:**  $P(\text{crime}|\text{feature}) = \frac{0.3}{0.44}$  We use Bayes rule.

c)

His full name is

Jugemu Jugemu (寿限無、寿限無)

Gokō-no surikire (五劫の擦り切れ)

Kaijarisuigyo-no (海砂利水魚の)

Suigyōmatsu Unraimatsu Fūraimatsu (水行末 雲来末 風来末)

Kuunerutokoro-ni Sumutokoro (食う寝る処に住む処)

Yaburakōji-no burakōji (やぶら小路の藪柑子)

Paipopaipo Paipo-no-shūringan (パイポパイポ パイポのシューリンガン)

Shūringan-no Gūrindai (シューリンガンのグーリンダイ)

Gūrindai-no Ponpokopī-no Ponpokonā-no (グーリンダイのポンポコピーのポンポコナーの)

Chōkyūmei-no Chōsuke (長久命の長助)

But we call him Bob

4:

Ways numbers add to 10

$$S = \{244, 424, 442, 334, 343, 433\}$$

244	$\binom{10}{2} \binom{8}{4} \binom{4}{4}$	3,375
424	$\binom{10}{4} \binom{6}{2} \binom{4}{4}$	3,150
442	$\binom{10}{4} \binom{6}{4} \binom{2}{4}$	3,150
334	$\binom{10}{3} \binom{7}{3} \binom{4}{4}$	4,200
343	$\binom{10}{3} \binom{7}{4} \binom{3}{4}$	4,200
433	$\binom{10}{4} \binom{6}{3} \binom{3}{4}$	4,200

**Answer:** Thus the total unique trips he can take is 22,275