Machine Learning Assignment 31

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Problem 30-1A

A:

Well, the chance of rolling anything on a fair dice is $\frac{1}{6}$, so there is a 16.666...% chance

B:

Dice 1 + Dice 2 equaling seven has a $\frac{1}{36}$ chance of happening, because that is just the probability of two specific rolls happening. If you add up every occurrence, then you have the chance it will happen. As the event happens six times, the chance of Dice 1 + Dice 2 equaling seven has around an $\frac{1}{6}$ chance

C:

The chance that $X_1 \neq 2$ has a $\frac{5}{6}$ percent chance, or a 83.333...% chance. The chance that $X_2 \geq 4$ is around a $\frac{3}{6}$ or a 50% chance. So the chance that the two of them happening together is $\frac{15}{36}$ or a 41.66666...% chance.

Problem 30-1B

A:

Well, $A \cap B$ is what A and B share so, I did... Either way its 0.2

$$\begin{aligned} P(A \cap B) &= P(A) + P(B) - P(A \cup B) \\ &= 1.1 - 0.9 \\ &= 0.2 \end{aligned}$$

B:

It's 0.5

$$\begin{aligned} P(A^c \cap B) &= P(A) - P(A \cup B) \\ &= 0.4 - 0.9 \\ &= 0.5 \end{aligned}$$

C:

It's 0.2

$$\begin{aligned} P(A - B) &= P(A) - P(A \cap B) \\ &= 0.4 - 0.2 \\ &= 0.2 \end{aligned}$$

D:

It's 0.1

$$\begin{aligned} P(A^c - B) &= P(A^c) - P(A^c \cap B) \\ &= 0.6 - 0.5 \\ &= 0.1 \end{aligned}$$

E:

It's 0.8

$$\begin{aligned} P(A^c \cup B) &= P(A^c) + P(B) - P(A^c \cap B) \\ &= 0.6 + 0.7 - 0.5 \\ &= 0.8 \end{aligned}$$

F:

It's 0.2

$$\begin{aligned} P(A \cap (B \cup A^c)) &= P(A) + P(B \cup A^c) - P(A \cup (B \cup A^c)) \\ &= 0.4 + 0.8 - 1 \\ &= 0.2 \end{aligned}$$

Problem 30-1C

$$\frac{20!}{k!(20-k)!} \cdot (0.3)^k \cdot (0.7)^{20-k}$$

Problem 30-1D

$$\frac{\frac{20!}{k!(20-k)!} \cdot \frac{70!}{(20-k)!(50+k)!}}{\frac{100!}{20!(80)!}}$$

Problem 30-1E