M 362K Post-Class Homework 3

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2-2

(a)

$A \cap B = \{1, 2\}$

(b)

$B' = \{\pi, water\}$

$\therefore N(B') = 2$

(c)

$A \cup B = \{1, 2, \pi, Jamaal, gum\}$

$\therefore (A \cup B)' = \{water\}$

2-7

We let the number of king-size matresses sold to be x, queen-size to be y and twin-size to be z

According to the question, we get: $\frac{1}{4}y = x + z$ and $3x = z$

By arranging the formulas, we get $x = \frac{z}{3}$ and $y = \frac{16}{3}z$

According to the axioms of probability theory, $Pr(kingorqueen) = 1 - Pr(twin) = 1 - \frac{z}{\frac{z}{3}+\frac{16z}{3}+z} = 1 - 0.15 = 0.85$

Therefore the probability that the next mattress sold is wither king or queen-size is 0.85, which is (D)

2-14

Since $N(U) = 20$, $N(A) = N(U) - N(A') = 6$ and $N(B) = N(U) - N(B') = 10$

Using the inclusion-exclusion principle, $N(A \cap B) = N(A) + N(B) - N(A \cup B) = 6 + 10 - 12 = 4$

2-19

Using the inclusion-exclusion principle $Pr(automobile \cup house) = Pr(automobile) + Pr(house) + Pr(automobile \cap house) = 0.6 + 0.3 - 0.2 = 0.7$

$\therefore Pr(automobileorhouse, notboth) = Pr(automobile \cup house) - Pr(automobile \cap house) = 0.7 - 0.2 = 0.5$

The answer is (B)

2-21

Using the inclusion-exclusion principle, we get:

$Pr(gymnastics \cup baseball \cup soccer) = Pr(gymnastics) + Pr(baseball) + Pr(soccer) - Pr(gymnastics \cap baseball) - Pr(gymnastics \cap soccer) - Pr(baseball \cap soccer) + Pr(gymnastics \cap baseball \cap soccer) = 0.28 + 0.29 + 0.19 - 0.14 - 0.12 - 0.1 + 0.08 = 0.48$

$Pr(watchnone) = 1 - Pr(gymnastics \cup baseball \cup soccer) = 1 - 0.48 = 52\%$

Therefore, the answer is (D)

2-23

$Pr(A \cup B) = Pr(A) + Pr(B) - Pr(A \cap B)$

$Pr(A \cup B') = Pr(A) + Pr(B) - Pr(A \cap B')$

$Pr(A \cup B) + Pr(A \cup B') = Pr(A) + Pr(B) - Pr(A \cap B) + Pr(A) + Pr(B) - Pr(A \cap B') = 2Pr(A) + (Pr(B) + Pr(B')) - (Pr(A \cap B) + Pr(A \cap B')) = 2Pr(A) + 1 - Pr(A) = Pr(A) + 1 = 1.6$

$\therefore Pr(A) = 0.6$

The answer is (D)

2-25

The Venn diagram is shown in Figure 1. The diagram is made according to the information given in the question

We can know that $Pr(rentersonly) = 1 - 0.17 - 0.11 - 0.64 = 0.08$

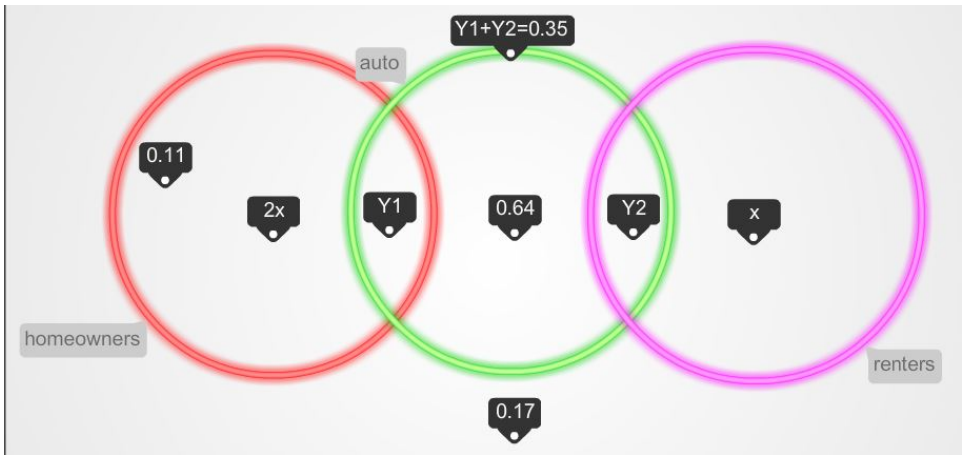

Figure 1: The Venn Diagram of 2-25

Therefore, we can know that 2*(0.08+Y2)=0.11+Y1

Since $Y1 + Y2 = 0.35$, we can know that $Pr(auto \cap renters) = 0.1 = 10\%$

The answer is (B)