HW 1.1. Weili Lin (1047020)

$p(\text{Jerry}) = 20\% = (p(J))$

$p(\text{Susan}) = 30\% = (p(S))$

$p(\text{Jerry} \cap \text{Susan}) = 8\% = (p(J \cap S))$

$p(\text{Jerry} - \text{Susan}) = 20\% - 8\% = 12\%$

$p(\text{Susan} - \text{Jerry}) = 30\% - 8\% = 22\%$

a. $\dfrac{p(J \cap S)}{p(S)} = \dfrac{8\%}{30\%} = 26.6667\%$

b. $p(J|\bar{S}) = \dfrac{p(J \cap \bar{S})}{p(\bar{S})} = \dfrac{p(J-S)}{1-p(S)} = \dfrac{12\%}{70\%} = 17.1428\%$

c. $\dfrac{p(J \cap S)}{p(J \cup S)} = \dfrac{8\%}{20\% + 30\% - 8\%} = \dfrac{8\%}{42\%} = 19.0476\%$

HW. 1.2. Weili Liu (10471020)

$P(H) = 80\%$

$P(S) = 90\%$

$P(H \cap S) = 91\%$

$$P(H \cap S) = P(H) + P(S) - P(H \cup S) \;\; \cancel{= P(H) + P(S) - P(H \cup S) = P(H) - P(S)}$$

$$= 80\% + 90\% - 91\% = 79\%$$

a. $P(H) - P(H \cap S) = 80\% - 79\% = 1\%$

b. $P(S) - P(H \cap S) = 90\% - 79\% = 11\%$

c. $100\% - P(H \cup S) = 9\%$

HW. 1.3. Weili Liu (10471020)

If the two events are independent, the probability that "Together they are at the bank of a day" is 20% times 30% equals to 6% which ~~is~~ not equals to 8%, so these two events are DEPENDENT events.

HW 1.4. Weili Liu (10471-20)

a. The probability of the event "the sum is 6" is $P(A)$

The probability of the event "the second die shows 5" is $P(B)$

$P(A) = \cancel{\frac{5}{36}}\ \frac{5}{36}$

$P(B) = \frac{1}{6}$

$P(A \cap B) = \frac{1}{36} \neq P(A)P(B) = \frac{5}{36} \times \frac{1}{6}$

So, they are dependent events.

b. The probability of the event "the sum is 7" is $P(A)$

~~HW 1.4~~ The probability of the event "the first die shows 5" is $P(B)$

$P(A) = \frac{1}{6}$

$P(B) = \frac{1}{6}$

$P(A \cap B) = \frac{1}{36} = P(A)P(B)$

So, these two events are independent events.

HW. 1.5 Weili Lin (1047020)

$p(TX) = 60\%$ $p(oil/TX) = 30\%$

$p(AK) = 30\%$ $p(oil/AK) = 20\%$

$p(NJ) = 10\%$ $p(oil/NJ) = 10\%$

1. $p(oil) = p(oil/TX)\,p(TX) + p(oil/AK)\,p(AK) + p(oil/NJ)\,p(NJ)$

$= 30\% \times 60\% + 20\% \times 30\% + 10\% \times 10\%$

$= 25\%$

2. $p(TX|oil)\,p(oil) = p(oil/TX)\,p(TX)$

$p(TX/oil) = \dfrac{30\% \times 60\%}{25\%} = 72\%$

HW. 1.6 weili Lin (1047020)

1. $p(\text{not survive}) = \dfrac{1490}{2201} = 67.69\%$

2. $p(1st) = \dfrac{325}{2201} = 14.76\%$

3. $p(1st\,|\,\text{survive}) = \dfrac{203}{711} = 28.55\%$

4. ~~$p(S) = \frac{711}{2201}$~~

$p(\text{survive} \cap 1st) = \dfrac{203}{2201} = 9.22\%$

$p(1st) = \dfrac{325}{2201}$

$p(1st)\,p(\text{survive}) \neq p(\text{survive} \cap 1st)$

$p(\text{survive}) = \dfrac{711}{2201}$

So, the are dependent events.

$p(1st)\,p(\text{survive}) = \dfrac{711}{2201} \times \dfrac{325}{2201} = 4.77\%$

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5. $P(1st \cap C|S) = \dfrac{P(1st \cap C \cap S)}{P(S)} = \dfrac{6}{711} = 0.84\%$

6. $P(A|S) = \dfrac{P(A \cap S)}{P(S)} = \dfrac{654}{711} = 91.98\%$

7. $P(A \cup C|S) = \dfrac{711}{711} = 100\%$

$P(1st|S) = \dfrac{203}{711}$

$P(A \cup C|S)P(1st|S) = \dfrac{711}{711} \times \dfrac{203}{711} = 28.55\%$

$P((A \cup C|S) \cap (1st|S)) = \dfrac{203}{711} = 28.55\%$

Since ~~the~~ $P(A \cup C|S)P(1st|S) = P((A \cup C|S) \cap (1st|S))$

So, these two events are independent events.