1)

(1, 13, 26, 13, 51) for this dataset means

Min Q1 Median Q3 Max

(370, 417, 446, 464, 514)

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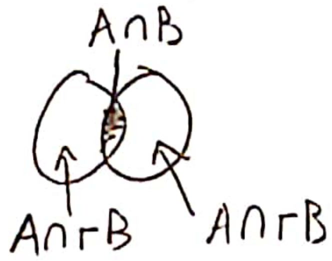
2) a.) A and B are two events with $P(A) > 0$ and $P(B) > 0$ and $A \cap B \neq 0$



i. $P(A \cup B) = P(A) + P(B) - P(A \cap B) \leq 1$

ii. $P(A \cap B) \geq P(A) + P(B) - 1$

iii. $P(A \cup B) \geq P(A \cap B)$

From ii. and iii. we know

iv. $P(A \cup B) \geq P(A) + P(B) - 1$

and from i. we know

V. $P(A \cup B) \leq P(A) + P(B)$

from iv. and V. we know

$P(A) + P(B) - 1 \leq P(A \cup B) \leq P(A) + P(B)$

2. b) Given A, B are independent

$P(A \cap B) = P(A) \cdot P(B)$

$P(A) = .3$, $P(B|A) = .4$

$P(A \cup B) =$ unknown

$P(A \cap B) = P(A) \cdot P(B|A) = (.3) \cdot (.4) = .12$

$P(B|A) = \frac{P(A \cap B)}{P(A)} = \frac{P(A) \cdot P(B)}{P(A)} = P(B) = .4$

$P(A \cup B) = P(A) + P(B) - P(A \cap B) = .3 + .4 - .12$

$P(A \cup B) = .58$

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3. a) For any two events, A and B with $P(A) > 0$ and $P(B) > 0$

If A and B are independent,

$P(A'B) = P((1-A)B)$

$= P(B - (A \cap B))$

$= P(B) - P(A \cap B)$ $\quad B \supseteq (A \cap B)$

$= P(B)(1 - P(A))$ $\quad P(A \cap B) = P(A) P(B)$

$= P(B) P(A')$

$= P(A') P(B)$

Therefore A' and B are independent

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3 b)

$P(A\cap B) = P(A)\cdot P(B)$

$P(A') = 1-P(A)$

$P(B') = 1-P(B)$

$P(A'B') = 1-P(A\cup B)$

$'' = 1-(P(A)+P(B)-P(A\cap B))$

$'' = 1-P(A)-P(B+P(A\cap B)$

$'' = 1-P(A)-P(B)+P(A)\cdot P(B)$

$'' = (1-P(A))-P(B)(1-P(A))$

$'' = (1-P(A))\cdot(1-P(B))$

$'' = P(A')\cdot P(B')$

showing A' and B' are independent.

3c)

A and B are not independent.

$P(A|B) = \dfrac{P(A\cap B)}{P(B)}$

$P(A|B)\cdot P(B) = P(A\cap B)$ i.

$P(A|B') = \dfrac{P(A\cap B')}{P(B')}$

$P(A|B')\cdot P(B') = P(A\cap B')$ ii.

$P(A\cap B') = P(A\cap(1-B))$

$= P(A - A\cap B)$

$= P(A)-P(A|B)P(B)$ (i)

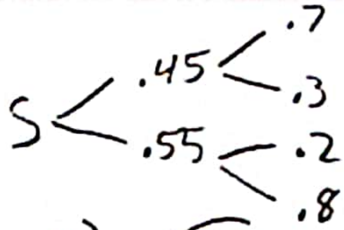
then...

$P(A|B')P(B') = P(A\cap B')$

$P(A|B')P(B') = P(A)-P(A|B)P(B)$

$P(A) = P(A|B)P(B)+P(A|B')P(B')$

4. a) .55



b) $(.45 \cdot .7) + (.55 \cdot .2) = .425$

c) $P(R \mid SAS) = \dfrac{P(R \cap sas)}{P(sas)} = \dfrac{.315}{.425} = .7412$

5) a) $.45 - .315 = .135$

b) $R = .45$, Sas but not $R = .11$ $\quad .45 + .11 = .56$

c) $1 - .56 = .44$

6) a) $\dfrac{7}{7+5} = \dfrac{7}{12} = .5833$

b) $\dfrac{7}{7+5} \cdot \left(\dfrac{9}{6+9}\right) + \dfrac{5}{12} \cdot \left(\dfrac{8}{8+7}\right) = \dfrac{103}{180} = .5722$

7) $P(X=0) = .1$
$P(X=1) = .2$
$P(X=2) = .3$
$P(X=3) = .3$
$P(X=4) = .2$

a) $P(X=2) = .2$
$P(X=4) = .2$

b) $P(X > 1) = .7$
$P(X \leq 4) = 1$

c) $P(1 \leq X \leq 3) = .7$
$P(2 < X \leq 4) = .5$

8. a) since $n=20$, probability is at a constant 30%, her results are unreliable at best

b) $P(X\geq 8) = 1 - P(X\leq 7) = 1 - \sum_{x=0}^{7} ({}_nC_x) p^x q^{(n-x)} = .2277$

c) $P(X<5) = \sum_{x=0}^{4} ({}_nC_x) p^x (1-p)^{(n-x)} = .2375$

d) $P(2\leq x\leq 4) = \sum_{x=2}^{4} ({}_nC_x) p^x (1-p)^{(n-x)} = .9444$

9.) $X \sim P(\lambda=6)$ $\quad \underline{\alpha=2} \quad \underline{t=3} \quad \underline{\lambda=6}$

a) $P(x=\lambda) \quad \dfrac{e^{-6}(6)^{\alpha}}{\alpha!} =$

$E(x)=6$

$V(x)=6$

b) $P(x\geq 1) = 1 - P(x<1)$

$= 1 - P(x=0)$

$= 1 - \dfrac{e^{-6}(6)^0}{0!}$

$= 1 - .0025$

$= .9975$

c) $Y = 3+5x^2$

$E(Y) = 3+5E(x)^2$

$V(x) = E(x^2) - (E(x))^2$

$6 = E(x^2) - 6^2$

$E(x^2) = 42$

$E(y) = 3+5(42)$

$E(x) = 213$