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STAT 350
HW3

1. $P(C) = 0.8$ C Event: has chains

$P(SC) = 0.6$ S Event: has shovel

$P(SC') = 0.15$

(1). $P(S|C) = \dfrac{P(S \cap C)}{P(C)} = \dfrac{0.6}{0.8} = \dfrac{3}{4}$

(2). $P(S|C') = \dfrac{P(S \cap C')}{P(C')} = \dfrac{0.15}{0.2} = \dfrac{3}{4}$

2. $P(R) = 0.02$ Event R: Rain on wedding

$P(WR | R) = .92$ WR: weather man predicts Rain

$P(WR | R') = 4\%$

$P(R | WR) = \dfrac{P(R \cap WR)}{P(WR)} = \dfrac{P(WR|R) \cdot P(R)}{P(WR \cap R') + P(WR \cap R)}$

$= \dfrac{.92 \cdot 0.02}{.92 \times 0.02 + .04 \times 0.98} = 0.319$

3. (a). $P_{(HHH)} = 0.78 \times .77 \times .75 = 0.45$

Event HHH: All hits

(b) $P_{(FFF)} = (1-0.78)(1-0.77)(1-0.75) = 0.01265$

Event FFF: All Fail

4. (a) $P(x=0) = 0.9$

(b) $P(x<2) = 0.9 + 0.055 + 0.025 = 0.98$

(c). $P(2 \leq x \leq 4) = P(2) + P(3) + P(4)$

$$= 0.025 + 0.015 + .004 = 0.044.$$

(d) $P(2<x<4) = P(3) = .015$

5. $Var(X) = E([X - E(X)]^2)$ let $E(x) = U_x$.

$$= E(x^2 - 2xU_x - U_x^2)$$

$$= E(x^2) - 2E(xU_x) + E(U_x^2)$$

$$= E(x^2) - 2E(x) \cdot U_x + E(U_x^2)$$

$$= E(x^2) - 2U_x^2 + U_x^2$$

$$= E(x^2) - U_x^2 = E(x^2) - [E(x)]^2 \quad \text{proved}$$

6. $E(g(x)) = E(ax+b)$

$$= aE(x) + b$$

$$= a\Sigma x \cdot p(x) + \Sigma p(x) \cdot b$$

$$= \Sigma p(x) \cdot (ax+b)$$

$$= \Sigma p(x) \cdot g(x) \quad \text{proved}.$$

7. (a). $E(x) = \sum x \cdot p(x) = 2 \times 2 + 3 \times .05 + 5 \times .25 + 7 \times .3 + 11 \times .15 + 13 \times .05$

$= 8$

(b) $Var(x) = E((x - u_x)^2)$

$= (2-8)^2 \times 0.2 + (3-8)^2 \cdot .05 + 3^2 \cdot .25 + 1^2 \cdot .3 + 3^2 \times .15$

$+ (13-8)^2 \cdot .05$

$= 13.6$

$6_x = \sqrt{Var(x)} = 3.687$

(c) $Y = 2X + 1$

$E(Y) = 2 E(X) + 1 = 17$

(d) $Var(Y) = Var(2x+1) = 4 Var(x) = 4 \times 13.6 = 54.4$

$6_y = \sqrt{54.4} = 7.376$

(e) $E(W) = E(x^2) + 1 = 4 \times .02 + 9 \times .05 + 25 \times .25 + 49 \times .3 + 121 \times .15$
$+ 169 \cdot .05$

$= 49.8$

8. (a). $E(x) = \sum x \cdot p(x) = 0.9$

(b) $P(x < 0.9) = P(0) = 0.6$

(c) $P(x \geq 4 \cap x \geq 4) = P(x \geq 4) = (0.075)^2 = 0.005625$