

HW 3

$$\textcircled{1} E(X) = \sum X \cdot P(X) = 1(.5) + 2(.26) + 3(0.1) + 4(.14) = \textcircled{1.88}$$

	Lives	Dies
X	350 - 0	350 - 250,000 = -249,650
P(X)	.998937	0.001063

$$\textcircled{2} E(X) = 350(.998937) - 249,650(.001063) = \textcircled{\$84.25}$$

Z = XY	P(Z)
1	
$\textcircled{2}$	$P(X=1 \cap Y=2) + P(X=2 \cap Y=1) = .06 + 0.10 = \textcircled{0.16}$
3	
$\textcircled{4}$	$P(X=4 \cap Y=1) + P(X=2 \cap Y=2) = 0.10 + 0.10 = \textcircled{0.20}$
5	0
$\textcircled{6}$	$P(X=2 \cap Y=3) + P(X=3 \cap Y=2) = .10 + .04 = \textcircled{0.14}$
7	0
8	
9	
10	0
11	0
12	

$$\textcircled{4} F_X(3) = P(X \leq 3) = 0.2 + 0.1 + 0.3 + 0.15 = \textcircled{0.75}$$

$$\textcircled{5} P(X \leq x) = F_X(x), \text{ so } f_X(3) = F_X(3) - F_X(2) = 0.45 - 0.35 = \textcircled{0.10}$$

$$f(3) = P(X=3)$$

$$\textcircled{8} \text{ Step 1 : } E(X) = \sum X \cdot P(X) = 4.94$$

$$\text{Step 2 : } E(X^2) = \sum X^2 \cdot P(X) = 30.68$$

$$\star \text{ Step 3 : } \sigma^2 = E(X^2) - [E(X)]^2 = 30.68 - (4.94)^2 = 6.2764$$

$$\text{Step 4 : } \sigma = \sqrt{6.2764} \approx \textcircled{2.51}$$

$$(9) P(Y=1 | X=4) = \frac{P(Y=1 \cap X=4)}{P(X=4)} = \frac{0.10}{0.14} = \left(\frac{5}{7}\right)$$

$$(10) \mu = \sum X \cdot P(X) = 0(.1) + 2(.3) + 7(.45) + 12(.15) = \underline{5.55}$$

$$(11) \text{Var}(X+Y) = \text{Var}(X) + \text{Var}(Y) + 2 \text{Cov}(X, Y)$$

$$\bullet \text{Var}(X) = E(X^2) - [E(X)]^2$$

\uparrow \downarrow \nwarrow \nearrow

$1^2(.5) + 2^2(.26) + 3^2(.1) + 4^2(.14) = 4.68$

1.88 from earlier $= 4.68 - 1.88^2 = \underline{\underline{1.1456}}$

$$\bullet \text{Var}(Y) = E(Y^2) - [E(Y)]^2 = 5.84 - [2.28]^2 = \underline{\underline{0.6416}}$$

\downarrow \downarrow

$1^2(.22) + 2^2(.28) + 3^2(.5) = 5.84$

$$\bullet \text{Cov}(X, Y) = E(XY) - E(X)E(Y) = 3.66 - (1.88)(2.28) = \underline{\underline{-0.6264}}$$

$$0 + (1)(2)(.06) + (1)(3)(.06) + (1)(4)(.10) + (2)(1)(.10) + (2)(2)(.10) + (2)(3)(.04) + (2)(4)(.04) + (3)(1)(.4) + (3)(2)(.1) + 0 + 0 = 3.66$$

$$\text{Var}(X+Y) = 1.1456 + 0.6416 + 2(-0.6264) = \underline{\underline{0.5344}}$$

$$\text{Var}(X-Y) = 1.1456 + 0.6416 - 2(-0.6264) = \underline{\underline{3.04}}$$

$\text{Var}(X-Y)$