# HW 3

① $E(x) = \sum x \cdot P(x) = 1(.5) + 2(.26) + 3(0.1) + 4(.14)$

$$= \boxed{1.88}$$

② 

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

$E(x) = 350(.998937)$

$-249,650(.001063)$

$= \boxed{\$84.25}$

③ 

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

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

⑤ $P(X \le x) = F_X(x)$, So $f_X(3) = F_X(3) - F_X(2) =$

$f(3) = P(X=3)$ $\qquad = 0.45 - 0.35 = \boxed{0.10}$

⑧ Step 1 : $E(x) = \sum x \cdot P(x) = 4.94$

Step 2 : $E(x^2) = \sum x^2 \cdot P(x) = 30.68$

★ Step 3 : $\sigma^2 = E(x^2) - [E(x)]^2 = 30.68 - (4.94)^2 = 6.2764$

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

⑨ $P(Y=1 \mid X=4) = \dfrac{P(Y=1 \cap X=4)}{P(x=4)} = \dfrac{0.10}{0.14} = \boxed{\dfrac{5}{7}}$

⑩ $\mu = \sum x \cdot P(x) = 0(.1) + 2(.3) + 7(.45) + 12(0.15)$
$= \boxed{5.55}$

⑪ $Var(x+y) = Var(x) + Var(y) + 2\,Cov(X,Y)$

- $Var(x) = E(x^2) - [E(x)]^2$   1.88 from earlier $= 4.68 - 1.88^2$
$= 1.1456$

$1^2(.5) + 2^2(.26) + 3^2(0.1) + 4^2(.14) = 4.68$

- $Var(y) = E(y^2) - [E(y)]^2 = 5.84 - [2.28]^2 = 0.6416$

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

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

- $Cov(xy) = E(xy) - E(x)E(y) = 3.66 - (1.88)(2.28)$
$= 8 - 0.6264$

$\left( \begin{array}{l} 0 + (1)(2)(.06) + (1)(3)(.06) + (1)(4)(0.10) \\ +(2)(1)(.10) + (2)(2)(.10) + (2)(3)(.04) + (2)(4)(.04) \\ + (3)(1)(.4) + (3)(2)(.1) + 0 + 0 \end{array} = 3.66 \right)$

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

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