

56. X : loss on insurance policy

$X \sim \text{Unif}(0, 1000)$

X^P : payment made to policyholder subject to deductible d

Expected payment w/ deductible = 25% of expected payment w/o deductible

$$[E(X)](0.25) = E(X^P)$$

Since uniform: $E(X) = \frac{1000-0}{2} = 500$

$$500(0.25) = 125 = E(X^P)$$

$$X^P = \begin{cases} 0 & x \leq d \\ x-d & x > d \end{cases}$$

$$E(X^P) = \int_{\text{all } x} x^P f(x) dx$$

$$E(X^P) = \int_0^d 0 \left(\frac{1}{1000}\right) dx + \int_d^{1000} (x-d) \left(\frac{1}{1000}\right) dx$$

$$= 0 + \frac{1}{1000} \left(\frac{(x-d)^2}{2} \right) \Big|_d^{1000} = \frac{(1000-d)^2}{2000}$$

$$E(X^P) = \frac{(1000-d)^2}{2000}$$
$$125 = \frac{(1000-d)^2}{2000}$$

$$250,000 = (1000-d)^2$$

$$\pm 500 = 1000 - d$$

$$d = 500 \text{ or } 1500$$

$\underbrace{\hspace{2cm}}$
outside range

$$\text{so } d = 500$$

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