5.6. \( X \): 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: \( E(X) = \frac{1000 - 0}{2} = 500 \)

\[500 \times 0.25 = 125 = E(X^p)\]

\[
x^p = \begin{cases} 
0 & x \leq d \\
(x-d) & x > d 
\end{cases}
\]

\[
E(X^p) = \int x^p f(x) \, dx
\]

all \( x \)

\[
E(X^p) = \int_0^d 0 \left( \frac{1}{1000} \right) \, dx + \int_d^{1000} (x-d) \left( \frac{1}{1000} \right) \, dx
\]

\[
= 0 + \frac{1}{1000} \left( \frac{(x-d)^2}{2} \right)_{d}^{1000} = \frac{(1000-d)^2}{2000}
\]

\[125 = \frac{(1000-d)^2}{2000} \]

\[250,000 = (1000-d)^2 \]

\[\pm 500 = 1000 - d \]

\[d = 500 \text{ or } 1500\]

outside range, so \( d = 500 \)

\( C \)