Exercise for September 20, 2008

May 2000 Course 1 Examination, Problem No. 34, also Study Note P-09-05, Problem No. 53

An insurance policy reimburses a loss up to a benefit limit of 10. The policyholder’s loss, \( Y \), follows a distribution with density function:

\[
f(y) = \begin{cases} 
\frac{2}{y^3}, & \text{for } y > 1, \\
0, & \text{otherwise}.
\end{cases}
\]

What is the expected value of the benefit paid under the insurance policy?

A. 1.0 B. 1.3 C. 1.8 D. 1.9 E. 2.0

Solution.

The amount paid under this policy is

\[
W = \begin{cases} 
Y, & 1 < Y \leq 10, \\
10, & Y > 10.
\end{cases}
\]

The expected amount paid is

\[
E(W) = \int_1^{10} y \cdot \frac{2}{y^3} dy + \int_{10}^{\infty} 10 \cdot \frac{2}{y^3} dy = \left[ -\frac{2}{y} \right]_1^{10} + \left( \frac{10}{y^2} \right)_{10}^{\infty} = 2 - 0.2 + 0.1 = 1.9.
\]

Answer D.

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