EXAM C QUESTIONS OF THE WEEK

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Week of January 21/08

A loss X is partially insured. The insurance policy has an ordinary deductible of 100.
The insurance pays $\frac{1}{2}$ of the loss in excess of 100 up to a loss (not payment) amount of 1000.
For a loss X above 1000, the insurance pays $X - 550$.

You are given the following limited expected values related to the loss variable X:
$E(X) = 2000$, $E(X \wedge 100) = 98$, $E(X \wedge 450) = 400$,
$E(X \wedge 550) = 480$, $E(X \wedge 900) = 725$, $E(X \wedge 1000) = 790$.

Find the expected amount paid by the insurance when a loss occurs.

The solution can be found below.

Week of January 21/08 - Solution

For an insurance with ordinary deductible a and maximum covered loss b,
the insurance payment is $(X \wedge b) - (X \wedge a)$.

For a deductible 100 and maximum covered loss of 1000, the insurance in question pays $\frac{1}{2}[(X \wedge 1000) - (X \wedge 100)]$ for a loss up to 1000.
For a loss just a 1000, this insurance would pay $\frac{1}{2}(1000 - 100) = 450$.
If we do not modify this expression, $\frac{1}{2}[(X \wedge 1000) - (X \wedge 100)]$ would pay 450 for any loss at or above 1000. In order to have an insurance payment of $X - 550$ for a loss above 1000, we must add $X - 550 - 450 = X - 1000$ to $\frac{1}{2}[(X \wedge 1000) - (X \wedge 100)]$. Therefore, we can represent the insurance payment as
$\frac{1}{2}[(X \wedge 1000) - (X \wedge 100)] + (X - 1000)_+ = X - \frac{1}{2}(X \wedge 100) - \frac{1}{2}(X \wedge 1000)$.

The expected amount paid by insurance when a loss occurs is
$E(X) - \frac{1}{2}E(X \wedge 100) - \frac{1}{2}E(X \wedge 1000) = 2000 - \frac{1}{2}(98) - \frac{1}{2}(790) = 1556$.