

1. An insurance company sells a policy with a linearly disappearing deductible such that no payment is made on a claim of 250 or less and full payment is made on a claim of 1000 or more. Calculate the payment made by the insurance company for a loss of 700.

**Components**

* Linearly disappearing deductible
* No payment for claim 250k or less
* Full payment is made on a claim of 1000 or more.
* What is the insurer’s payment on a loss of 700?

**Disappearing Deductible** — a formula deductible that decreases as the amount of loss increases and disappears entirely to provide full coverage when the loss reaches a specified amount. Disappearing deductibles were once commonly used in property insurance policies. <https://www.irmi.com/term/insurance-definitions/disappearing-deductible>

**Notes**: So between 250 and 1000 there is a linearly disappearing deductible, where by 250 represents 0 and 1000 100%. So there is a linear relationship here. How do we calculate values across this line?

**Interpolation**:

If the two known points are given by the coordinates (x0, y0, and (x1, y1), the linear interpolant is the straight line between these points. For a value x in the interval (x0, x1), the value y along the straight line is given from the equation of slopes

Y – y0 / x – x0 = (y1 – y0) / (x1 – x0)

<https://en.wikipedia.org/wiki/Linear_interpolation>

Solution: Linearly interpolate to get the solution.

(700-250) / (1000 – 250) = 600.

1. The random variable *X* represents the random loss, before any deductible is applied, covered by an insurance policy.
   1. The probability density function of *X* is

*f* (*x*) = 2*x*, 0 *< x <* 1.

Payments are made subject to a deductible, *d*, where 0 *< d <* 1. The probability that a claim payment

is less than 0.5 is equal to 0.64. Calculate the value of *d*.

I found this problem difficult to understanding.

Solution: The probability of a loss paid above the deductible is some function of 0.5 + d.

1. Calculate the percentage reduction in loss costs by moving from a 100 deductible to a 250 deductible.



Solution: -27%

1. Mr. Orfanos purchases a homeowners policy with an 80% coinsurance clause. The home is insured for 150,000. The home was worth 180,000 on the day the policy was purchased. Lightning causes 20,000 worth of damage. On the day of the storm the home is worth 250,000. Calculate the benefit payment Mr. Orfanos receives from his policy.

|  |  |
| --- | --- |
| Coinsurance | 80% |
| Limit (amount insured) | $ 150,000 |
| Home Value Start | $ 180,000 |
| Damage | $ 20,000 |
| Home Value End | $ 250,000 |
|  |  |
| Implied Limit | $ 200,000 |
| Ratio 80% Value to Limit | 75% |
| Times Loss | $ 15,000 |

Solution: Implied limit is the coinsurance times the value of the home. Since 200,000 is greater than 150,000, the homeowner is underinsured. Therefore, the solution is the ratio of the limit to the value of the home times the loss (150,000 / 200,000) \* 20,000 = 15,000.

1. A company purchases a commercial insurance policy with a property policy limit of 70,000. The actual value of the property at the time of a loss is 100,000. The insurance policy has a coinsurance provision of 80% and a 200 deductible, which is applied to the loss before the limit or coinsurance are applied. A storm causes damage in the amount of 20,000. Calculate the insurance company’s payment.



Solution: 17,325. I applied the same approach as in question #4, just discounted the loss amount by the $200 deductible before making the final loss calculation.

1. Find the end-of-1999 estimated loss reserve using:
   1. The expected loss ratio technique
   2. The chain ladder technique with arithmetic average loss development factors







**Solutions**:

1. $10,478
2. $14,966
3. Find the end-of-1999 estimated loss reserve using the Bornhuetter-Ferguson technique with geometric average loss development factors.



**Geometric Average**: Multiply all age factors together for a given development period (column) and take the nth root











1. Calculate the indicated actuarial reserve using the Bornhuetter-Ferguson method and volume-weighted average loss development factor.



1. Calculate the ratio discounted reserves to undiscounted reserves as of December 31, 2008.



1. Calculate the total loss reserve using the Bornhuetter-Ferguson method and three year arithmetic average paid loss development factors

