

Question #139

Key: C

Let X be the number of claims.

$$E(X | I) = 0.9(0) + 0.1(2) = 0.2$$

$$E(X | II) = 0.8(0) + 0.1(1) + 0.1(2) = 0.3$$

$$E(X | III) = 0.7(0) + 0.2(1) + 0.1(2) = 0.4$$

$$\text{Var}(X | I) = 0.9(0) + 0.1(4) - 0.2^2 = 0.36$$

$$\text{Var}(X | II) = 0.8(0) + 0.1(1) + 0.1(4) - 0.3^2 = 0.41$$

$$\text{Var}(X | III) = 0.7(0) + 0.2(1) + 0.1(4) - 0.4^2 = 0.44.$$

$$\mu = (1/2)(0.2 + 0.3 + 0.4) = 0.3$$

$$v = (1/3)(0.36 + 0.41 + 0.44) = 0.403333$$

$$a = (1/3)(0.2^2 + 0.3^2 + 0.4^2) - 0.3^2 = 0.006667$$

$$k = 0.403333 / 0.006667 = 60.5$$

$$Z = \frac{50}{50 + 60.5} = 0.45249.$$

For one insured the estimate is $0.45249(17/50) + 0.54751(0.3) = 0.31810$.

For 35 insureds the estimate is $35(0.31810) = 11.13$.