

Question #87**Key: E**

$$f(x) = 0.01, \quad 0 \leq x \leq 80$$

$$= 0.01 - 0.00025(x - 80) = 0.03 - 0.00025x, \quad 80 < x \leq 120$$

$$E(x) = \int_0^{80} 0.01x \, dx + \int_{80}^{120} (0.03x - 0.00025x^2) \, dx$$

$$= \frac{0.01x^2}{2} \Big|_0^{80} + \frac{0.03x^2}{2} \Big|_{80}^{120} - \frac{0.00025x^3}{3} \Big|_{80}^{120}$$

$$= 32 + 120 - 101.33 = 50.66667$$

$$E(X - 20)_+ = E(X) - \int_0^{20} xf(x) \, dx - 20(1 - \int_0^{20} f(x) \, dx)$$

$$= 50.66667 - \frac{0.01x^2}{2} \Big|_0^{20} - 20\left(1 - 0.01x \Big|_0^{20}\right)$$

$$= 50.66667 - 2 - 20(0.8) = 32.66667$$

$$\text{Loss Elimination Ratio} = 1 - \frac{32.66667}{50.66667} = 0.3553$$