Question #166
Answer: E

$$\bar{a}_x = \int_0^\infty e^{-0.08t} dt = 12.5$$

$$\bar{A}_x = \int_0^\infty e^{-0.08t} (0.03) dt = \frac{3}{8} = 0.375$$

$${}^2\bar{A}_x = \int_0^\infty e^{-0.13t} (0.03) dt = \frac{3}{13} = 0.23077$$

$$\sigma\left(\bar{a}_{\overline{T|}}\right) = \sqrt{\mathrm{Var}\left[\bar{a}_{\overline{T|}}\right]} = \sqrt{\frac{1}{\delta^2}\left[{}^2\bar{A}_x - \left(\bar{A}_x\right)^2\right]} = \sqrt{400\left[0.23077 - (0.375)^2\right]} = 6.0048$$

$$\Pr\left[\bar{a}_{\overline{T|}} > \bar{a}_x - \sigma\left(\bar{a}_{\overline{T|}}\right)\right] = \Pr\left[\bar{a}_{\overline{T|}} > 12.5 - 6.0048\right]$$

$$= \Pr\left[\frac{1-v^T}{0.05} > 6.4952\right] = \Pr\left[0.67524 > e^{-0.05T}\right]$$

$$= \Pr\left[T > \frac{-\ln 0.67524}{0.05}\right] = \Pr\left[T > 7.85374\right]$$

$$= e^{-0.03\times 7.85374} = 0.79$$