

SOA Exam P 045 (Univariate Probability Dist.)

$$\text{Given: } f(x) = \begin{cases} \frac{|x|}{10} & \text{for } -2 \leq x \leq 4 \\ 0 & \text{o/w} \end{cases}$$

$$\text{Find: } E(x) = ?$$

Solutions:

$$\text{Rewrite } f(x) = \begin{cases} \frac{-x}{10} & -2 \leq x \leq 0 \\ \frac{x}{10} & 0 \leq x \leq 4 \\ 0 & \text{o/w} \end{cases}$$

$$\begin{aligned} E(x) &= \int_{-2}^0 x \left(-\frac{x}{10}\right) dx + \int_0^4 x \left(\frac{x}{10}\right) dx \\ &= -\frac{1}{10} \int_{-2}^0 x^2 dx + \frac{1}{10} \int_0^4 x^2 dx \\ &= -\frac{1}{10} \left[\frac{x^3}{3} \right]_{-2}^0 + \frac{1}{10} \left[\frac{x^3}{3} \right]_0^4 \\ &= -\frac{1}{10} \left[0 - \left(-\frac{8}{3}\right) \right] + \frac{1}{10} \left[\frac{64}{3} - 0 \right] \\ &= -\frac{1}{10} \left(\frac{8}{3}\right) + \frac{1}{10} \left(\frac{64}{3}\right) \\ &= \frac{28}{15} \end{aligned}$$

ANS: D