

Exam P 033 (Univariate Prob Dist.)

We are given $f(x) = \begin{cases} 0.005(20-x) & 0 < x < 20 \\ 0 & \text{otherwise.} \end{cases}$

$$\begin{aligned} \text{Prob}(x > 16 | x > 8) &= \frac{P(x > 8 \cap x > 16)}{P(x > 8)} = \frac{P(x > 16)}{P(x > 8)} \\ &= \frac{1 - F_x(16)}{1 - F_x(8)} \end{aligned}$$

We know that

$$\begin{aligned} F_x(x) &= \int_0^x f(y) dy = \int_0^x 0.005(20-y) dy = 0.1y - 0.0025y^2 \Big|_0^x \\ &= 0.1x - 0.0025x^2 \end{aligned}$$

$$\Rightarrow F_x(16) = 0.1(16) - 0.0025(16)^2 = 0.96$$

$$F_x(8) = 0.1(8) - 0.0025(8)^2 = 0.64$$

Thus we get $\text{Prob}(x > 16 | x > 8) = \frac{1 - F_x(16)}{1 - F_x(8)} = \frac{1 - 0.96}{1 - 0.64} = \frac{0.04}{0.36} = \boxed{\frac{1}{9}}$