

Problem 47

T : time until failure

$T \sim \text{Exponential}(\lambda)$

$$E(T) = \lambda = 10$$

$$f(t) = \frac{1}{10} \cdot e^{-\frac{t}{10}}$$

$$P = \begin{cases} X & 0 \leq T < 1 \\ \frac{X}{2} & 1 \leq T < 3 \\ 0 & T \geq 3 \end{cases}$$

$$1000 = E(P)$$

$$1000 = \int_0^1 \frac{X}{10} \cdot e^{-\frac{t}{10}} \cdot dt + \int_1^3 \frac{X}{20} \cdot e^{-\frac{t}{10}} \cdot dt + 0$$

$$1000 = -X \cdot e^{-\frac{t}{10}} \Big|_0^1 + -\frac{X}{2} \cdot e^{-\frac{t}{10}} \Big|_1^3$$

$$1000 = .1772 \cdot X$$

$$5664 = X$$

10