

Homework 6 – Due 5/11 at 9 AM Eastern Time

1. Let X be a continuous random variable with PDF given by $f_X(x) = \begin{cases} \frac{c}{2}x^2, & |x| \leq 2 \\ 0, & \text{otherwise} \end{cases}$

- Find the constant c .
- Find $E(X)$
- Find $P(X \geq 1)$.

2. Let X be a continuous random variable with PDF given by

$$f_X(x) = e^{-|x|}, \text{ for all } x \in \mathbb{R}$$

$$Y = 2X$$

Find the CDF of Y

3. Let X be a continuous random variable with PDF given by

$$f_X(x) = \begin{cases} 3x^2, & 0 \leq x \leq 2 \\ 0, & \text{otherwise} \end{cases}$$

Find $P(X \leq 1 | X > \frac{1}{2})$

4. Let X be a continuous random variable with PDF

$$f_X(x) = \begin{cases} x(2x + 5), & 0 \leq x \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

If $Y = \frac{3}{X} + 2$, find $\text{Var}(Y)$

5. Let $X \sim \text{Uniform}\left(\frac{\pi}{2}, \pi\right)$ and $Y = \sin(X)$. Find $f_Y(y)$.