

# Math 262

## Section 3.1

Day 19

1. Let  $X$  be a continuous random variable with pdf

$$f(x) = \begin{cases} x & 0 \leq x \leq 1, \\ 2 - x & 1 \leq x \leq 2, \\ 0 & \text{otherwise.} \end{cases}$$

(a) Sketch the pdf of  $X$ . *If you are sitting next to a wall, sketch it on the wall!*

(b) Find the cdf of  $X$  and sketch it (*on a wall, if you are next to one*).

(c) What is  $P(X < 1.5)$ ?

(d) Find a value  $\eta_{0.75}$  such that  $P(X \leq \eta_{0.75}) = 0.75$ .

2. Suppose that a continuous random variable  $X$  has pdf  $f(x) = kx(4 - x)$  for  $0 \leq x \leq 4$ , and  $f(x) = 0$  otherwise.

(a) Sketch this pdf (*on a wall, if you are next to one*). Then, without computing anything, sketch the cdf of  $X$  (make your best guess of what this looks like).

(b) What is the value of  $k$ ?

(c) Find  $P(X > 3 \text{ or } X < 1)$ .

3. Suppose that the cdf of a random variable  $X$  is  $F(x) = 1 - e^{-5x}$  for  $x > 0$ , and  $F(x) = 0$  otherwise.

(a) What is the pdf of  $X$ ? Sketch both the pdf and the cdf (*on a wall...*).

(b) What is  $P(\frac{1}{4} < X < \frac{1}{3})$ ? Can you get this from *either* the cdf or the pdf?

4. Random variable  $X$  has pdf

$$f(x) = \begin{cases} ax + bx^2 & 0 < x < 1, \\ 0 & \text{otherwise.} \end{cases}$$

Furthermore,  $P(X < \frac{1}{2}) = \frac{3}{16}$ . What is the median of  $X$ ?

5. Let  $Y$  be a random variable with pdf given by  $f(y) = \begin{cases} \frac{y}{2} & \text{if } 0 \leq y \leq 2, \\ 0 & \text{otherwise.} \end{cases}$

(a) Find a value  $\eta_{0.25}$  such that  $P(Y \leq \eta_{0.25}) = 0.25$ .

(b) What is the median of  $Y$ ?