

1. The function f given to the right is the probability density function for a continuous random variable X .

$$f(x) = \begin{cases} 0 & \text{for } x < 0 \\ \frac{1}{2} & \text{for } 0 \leq x < 1 \\ -\frac{1}{4}x + \frac{3}{4} & \text{for } 1 \leq x < 3 \\ 0 & \text{for } x \geq 3 \end{cases}$$

- (a) Use the distribution to find each of the following. **Indicate how you use the function and label your answer.**

$$P\left(\frac{1}{2} < X \leq 1\right)$$

$$P\left(\frac{1}{2} < X \leq 2\right)$$

$$P(X \geq 2)$$

- (b) Sketch a graph of the density function. **Label the axes, of course!**
- (c) Give the **cumulative** probability function F as a piecewise defined function.
- (d) Sketch the graph of the cumulative probability function F .

2. Consider the cumulative probability function to the right, for a continuous random variable X .

$$F(x) = \begin{cases} 0 & \text{for } x < 0 \\ \frac{x^2}{4} & \text{for } 0 \leq x \leq 2 \\ 1 & \text{for } x > 2 \end{cases}$$

- (a) Use the cumulative probability function to find each of the following. **Indicate how you use the function and label your answer.**

$$P\left(1 < X \leq \frac{3}{2}\right)$$

$$P\left(X \leq \frac{3}{4}\right)$$

$$P\left(X = \frac{3}{4}\right)$$

- (b) Sketch a graph of the cumulative probability function. **Label the axes, of course!**
- (c) Give the probability density function f as a piecewise defined function.
- (d) Sketch the graph of the probability density function f .