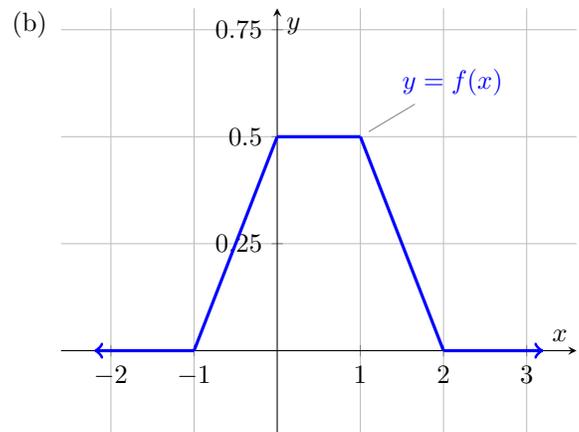
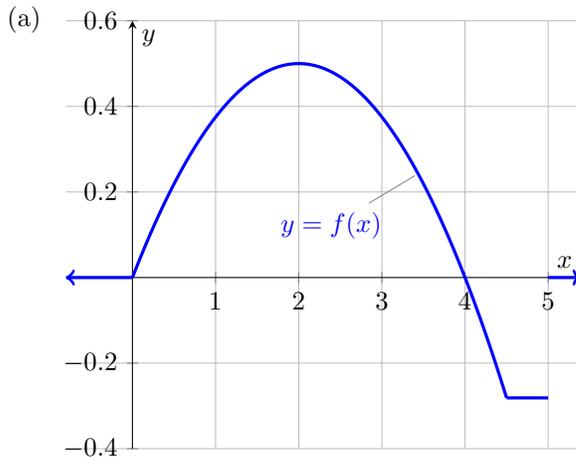


Ex 1 Suppose that the probability density function for a random variable X representing the lifespan of a lightbulb at the store is

$$f(x) = \begin{cases} e^{-x} & x \geq 0 \\ 0 & x < 0 \end{cases}$$

What is the probability that a randomly chosen lightbulb lasts between 1 and 3 years? What about the probability that it lasts for more than 2 years?

Ex 2 Could the following two graphs be graphs of a probability density function?



Ex 3 A random number generator (RNG) chooses real numbers between 0 and 100 according to a uniform distribution.

(a) What is the probability density function for this RNG?

(b) What is the probability that a randomly chosen number is between 50 and 60?

(c) What is the probability that a randomly chosen number is between 10 and 20?

Ex 4 Let X be a random variable that measures the duration of cell phone class in a particular city and assume that X has an exponential distribution with density function

$$g(t) = \begin{cases} 0.5e^{-0.5t} & t \geq 0 \\ 0 & t < 0 \end{cases}$$

where t denotes the duration (in minutes) of a randomly selected call.

(a) Find the probability that a randomly selected call will last between 2 and 3 minutes.

(b) Find the probability that a randomly selected call will last less than 2 minutes.

Ex 5 Find the expected value of the RNG which is selecting values between 0 and 100. What if it were computing values between 100 and 300?

Ex 6 What is the expected value of a random variable X with probability density function $\frac{1}{x}$ on the interval $[1, e]$?