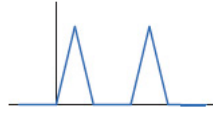
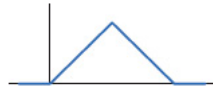


1. The graphs (a), (b), and (c) are density functions and I, II, and III are cumulative distribution functions. Match them.

(a)



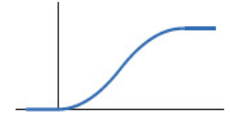
(b)



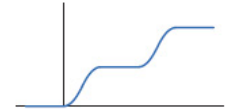
(c)



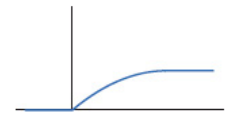
(I)



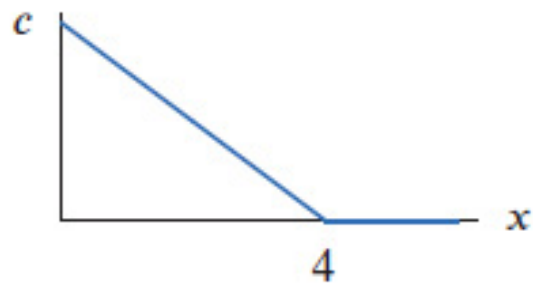
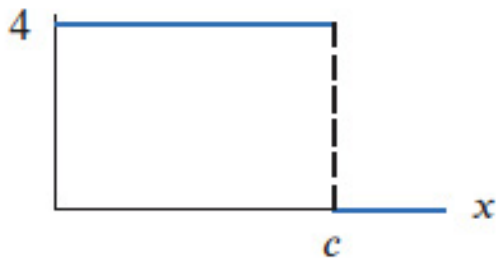
(II)



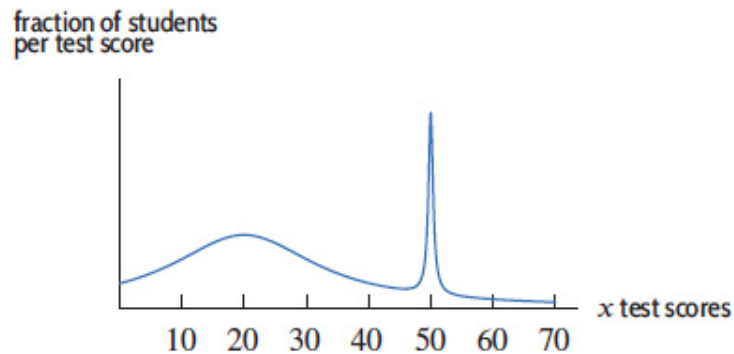
(III)



2. Decide if the functions below could be probability density functions, cumulative distribution functions, or neither. Give reasons. Sketch and label the other function for each.



3. The graph below shows the density function p describing the scores of a large number of people taking a standardized test. Does this function imply that most people receive a score near 50?



4. The cumulative distribution function for heights (in meters) of trees in a forest is $F(x)$.
- Explain in terms of trees the meaning of the statement $F(7) = 0.6$.
 - Which is greater, $F(6)$ or $F(7)$? Justify your answer in terms of trees.
5. Explain what is wrong with each statement.
- The function $p(t) = t^2$ is a density function.
 - The function $p(x) = x^2 e^x$ is a density function.
 - The function $P(x) = x^2 e^x$ is a cumulative distribution function.
 - The function $P(t) = e^{-t^2}$ is a cumulative distribution function.

6. This is an old exam problem.

Yennifer's Introductory Thermodynamics of Muck course is supposed to start at **9:10 am**, but her instructor does not consistently start on time. Let $p(x)$ be the probability density function for the amount of time x , in minutes, between when the instructor is supposed to start the class and when they actually start class.

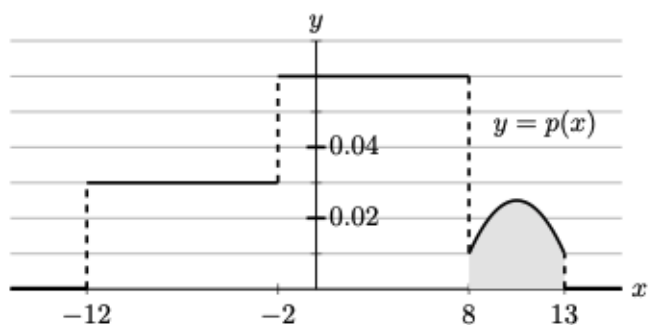
For parts **a.-c.**, you do not need to justify your answer.

- a. [2 points] Yennifer is coming from another class and therefore always arrives at 9:06, exactly 4 minutes before class is supposed to start. Find the probability that class starts before Yennifer arrives.

Answer: _____

Note that:

- $x = 0$ represents class starting at 9:10 am.
- A negative value of x represents starting class early.
- All of the nonzero portion of $p(x)$ is given in the graph below.
- The area of the shaded region is 0.1.



- b. [3 points] Which of the following statements is best supported by the equation $p(12) = 0.02$? Circle the **one** best answer.
- i. The probability that the instructor will start class at 9:22 is 2%.
 - ii. The probability that the instructor will start class between 9:21 and 9:23 is about 2%.
 - iii. The probability that the instructor will start class between 9:21 and 9:23 is about 4%.
 - iv. The probability that the instructor has started class by 9:22 is about 2%.
 - v. The probability that the instructor has started class by 9:22 is about 48%.
- c. [3 points] Let $P(x)$ be the cumulative distribution function for $p(x)$. Which of the following could be the formula for $P(x)$ **on the interval** $-2 < x < 8$? Circle **all** answers that could be correct.
- | | | |
|----------------|------------------------|----------------------------|
| i. $P(x) = 0$ | iii. $P(x) = 0.06x$ | v. $P(x) = 0.06(x+2)+0.3$ |
| ii. $P(x) = 1$ | iv. $P(x) = 0.06(x+2)$ | vi. $P(x) = 0.1-0.06(x-8)$ |