CENGAGE | WEBASSIGN

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MC 006, section B, Fall 2019

8.5 Probabilidad (Homework)

INSTRUCTOR
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Current Score

QUESTION	1	2	3	4	5	6	7	8
POINTS	2/2	2/2	2/2	3/3	2/0	3/2	2/2	3/3

TOTAL SCORE

19/16 118.8%

Due Date

DECEMBER 21
11:59 PM CST

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Assignment Submission & Scoring

Assignment Submission

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

Assignment Scoring

Your last submission is used for your score.

Your last submission is used for your score.

1. 2/2 points Previous Answers SCalcET8 8.5.001. My Notes Ask Your Teacher

Let $f(x)$ be the probability density function for the lifetime of a manufacturer's highest quality car tire, where x is measured in miles. Explain the meaning of each integral.

(a) $\int_{40,000}^{50,000} f(x)\,dx$

- ○ The integral is the probability that a randomly chosen tire will have a lifetime under 50,000 miles.
- ○ The integral is the probability that a randomly chosen tire will have a lifetime of exactly 50,000 miles.
- ◉ The integral is the probability that a randomly chosen tire will have a lifetime between 40,000 and 50,000 miles.
- ○ The integral is the probability that a randomly chosen tire will have a lifetime of at least 40,000 miles.

(b) $\int_{15,000}^{\infty} f(x)\,dx$

- ○ The integral is the probability that a randomly chosen tire will have a lifetime of exactly 15,000 miles.
- ◉ The integral is the probability that a randomly chosen tire will have a lifetime of at least 15,000 miles.
- ○ The integral is the probability that a randomly chosen tire will not wear out.
- ○ The integral is the probability that a randomly chosen tire will have a lifetime under 15,000 miles.

2. 2/2 points Previous Answers SCalcET8 8.5.002. My Notes Ask Your Teacher

Let $f(t)$ be the probability density function for the time it takes you to drive to school in the morning, where t is measured in minutes. Express the following probabilities as integrals. (If you need to use ∞ or $-\infty$, enter INFINITY or −INFINITY, respectively.)

(a) The probability that you drive to school in less than 35 minutes

$$\int_{0}^{35} f(t)\,dt$$

Upper limit: 35 ✓
Lower limit: 0 ✓

(b) The probability that it takes you more than a quarter of an hour to get to school

$$\int_{15}^{\text{INFINITY}} f(t)\,dt$$

Upper limit: INFINITY ✓
Lower limit: 15 ✓

3. 2/2 points Previous Answers SCalcET8 8.5.005.MI. My Notes Ask Your Teacher

Let $f(x) = \dfrac{c}{1 + x^2}$.

(a) For what value of c is f a probability density function?

$c =$

1п

✓

(b) For that value of c, find $P(-3 < X < 3)$. (Round your answer to three decimal places.)

0.795 ✓

4. 3/3 points Previous Answers SCalcET8 8.5.006. My Notes Ask Your Teacher

Let $f(x) = k(5x - x^2)$ if $0 \le x \le 5$ and $f(x) = 0$ if $x < 0$ or $x > 5$.

(a) For what value of k is f a probability density function?

$k =$

6125

(b) For that value of k, find $P(X > 1)$.

$P(X > 1) =$

112125

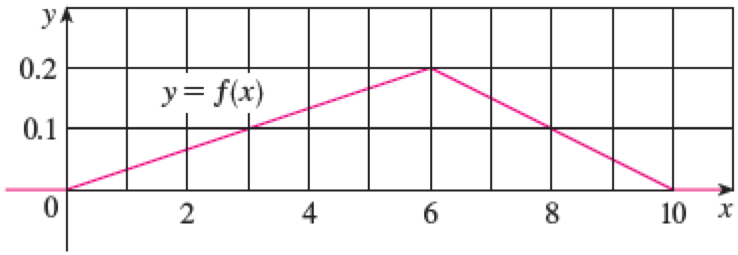
(c) Find the mean.

$\mu =$

52

5. 2/0 points Previous Answers SCalcET8 8.5.008. My Notes Ask Your Teacher

Consider the following function whose graph is shown.



(a) Explain why the function whose graph is shown above is a probability density function.

- ○ The derivative of the function is constant.
- ◉ The total area under the function is 1.
- ○ The integral of the function is 10.
- ○ The values of both endpoints of the function are 0.
- ○ The highest value of the function is 0.2.

(b) Use the graph to find the following probabilities. (Round your answers to three decimal places.)

(i) $P(X < 3)$

0.15

(ii) $P(3 \le X \le 8)$

0.75

(c) Calculate the mean. (Round your answer to three decimal places.)

5.333

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6. 3/2 points Previous Answers SCalcET8 8.5.011. My Notes Ask Your Teacher

An online retailer has determined that the average time for credit card transactions to be electronically approved is 1.6 seconds. (Round your answers to three decimal places.)

(a) Use an exponential density function to find the probability that a customer waits less than a second for credit card approval.

0.465 ✔

(b) Find the probability that a customer waits more than 3 seconds.

0.153 ✔

(c) What is the minimum approval time for the slowest 5% of transactions?

4.793 ✔ sec

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7. 2/2 points Previous Answers SCalcET8 8.5.501.XP. My Notes Ask Your Teacher

Let $f(x) = xe^{-x}$ if $x \geq 0$ and $f(x) = 0$ if $x < 0$.

(a) Is f a probability density function?

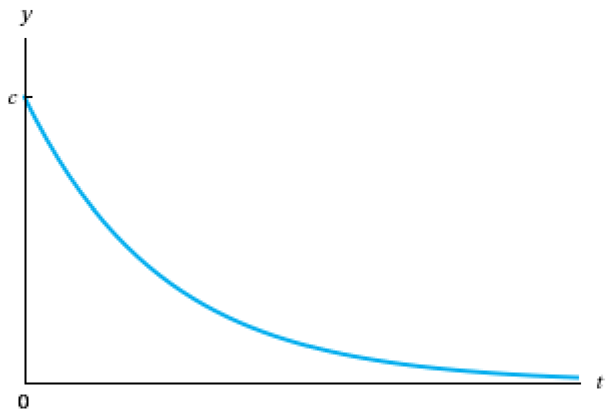
- (●) Yes
- ( ) No

✔

(b) Find $P(4 \leq X \leq 5)$. (Round your answer to three decimal places.)

0.051 ✔

8. 3/3 points Previous Answers SCalcET8 8.5.AE.002. My Notes Ask Your Teacher



Video Example

EXAMPLE 2 Phenomena such as waiting times and equipment failure times are commonly modeled by exponentially decreasing probability density functions. Find the exact form of such a function.

SOLUTION Think of the random variable as being the time you wait on hold before an agent of a company you're telephoning answers your call. So instead of x, let's use t to represent time, in minutes. If f is the probability density function and you call at time $t = 0$, then, from this definition, the integral below represents the probability that an agent answers within the first two minutes.

$$\int_0^2 f(t)\,dt$$

It's clear that $f(t) =$ 0 for $t < 0$ (the agent can't answer before you place the call). For $t > 0$ we are told to use an exponentially decreasing function, that is, a function of the form $f(t) = Ae^{-ct}$, where A and c are positive constants.

$$f(t) = \begin{cases} 0 & \text{if } t < 0 \\ Ae^{-ct} & \text{if } t \geq 0 \end{cases}$$

We use this equation to determine the value of A:

$$1 = \int_{-\infty}^{\infty} f(t)\,dt = \int_{-\infty}^{0} f(t)\,dt + \int_{0}^{\infty} f(t)\,dt$$

$$= \int_{0}^{\infty} Ae^{-ct}\,dt = \lim_{x \to \infty} \int_{0}^{x} Ae^{-ct}\,dt$$

$$= \lim_{x \to \infty} \Big[\ \ -1cAe-ct \ \ \Big]_0^x$$

$$= \lim_{x \to \infty} \ \ -1cAe-cx+1cA$$

$$= \ \ 1cA$$

.

1cA $A =$ c

Therefore = 1 and so . Thus every exponential density function has the following form.

$$f(t) = \begin{cases} 0 & \text{if } t < 0 \\ ce^{-ct} & \text{if } t \geq 0 \end{cases}$$

A typical graph is shown in the figure.

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