Lesson 3.2-3.3

测验, 11 个问题

11/11 分 (100%)

✔ 恭喜！您通过了！

下一项

✔ 1 / 1 分

1。
If continuous random variable X has probability density function (PDF) $f(x)$, what is the interpretation of the following integral: $\int_{-2}^{5} f(x)dx$?

- $P(X \leq -2 \cap X \leq 5)$
- $P(X \leq -2 \cap X \geq 5)$
- ✔ $P(X \geq -2 \cap X \leq 5)$

正确

This could also be written $P(-2 \leq X \leq 5)$.

- $P(X \geq -2 \cup X \leq 5)$

✔ 1 / 1 分

2。
If $X \sim \text{Uniform}(0, 1)$, then what is the value of $P(-3 < X < 0.2)$?

0.2

正确回答

$\int_{-3}^{0.2} f(x)dx = \int_{-3}^{0.2} I_{\{0<x<1\}}(x)dx = \int_{0}^{0.2} 1dx = 0.2.$

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1 / 1 分

3。

If $X \sim \text{Exponential}(5)$, find the expected value $E(X)$. (Round your answer to one decimal place.)

0.2

正确回答

With $X \sim \text{Exponential}(\lambda)$, we have $E(X) = 1/\lambda$.

1 / 1 分

4。

Which of the following scenarios could we most appropriately model using an exponentially distributed random variable?

- The probability of a light bulb failure before 100 hours in service
- The hours of service until all light bulbs in a batch of 5000 fail
- The lifetime in hours of a particular lightbulb

正确

This is a positive, continuous quantity.

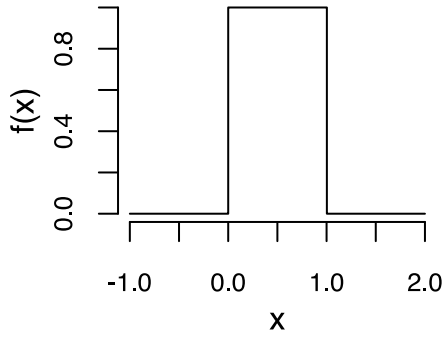
- The number of failed lightbulbs in a batch of 5000 after 100 hours in service

1 / 1 分

5。

If $X \sim \text{Uniform}(2, 6)$, which of the following is the PDF of X ?

Option:



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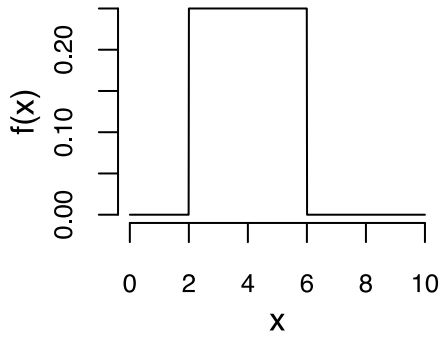
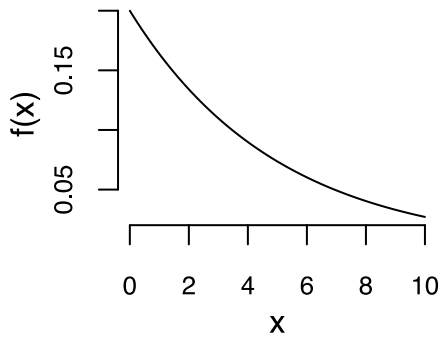


正确

This PDF has uniform value (1/4) over the interval $[2, 6]$ and is 0 everywhere else.

Option:



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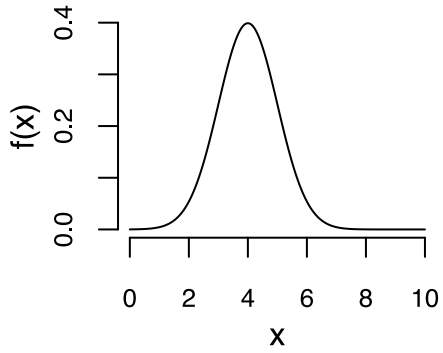

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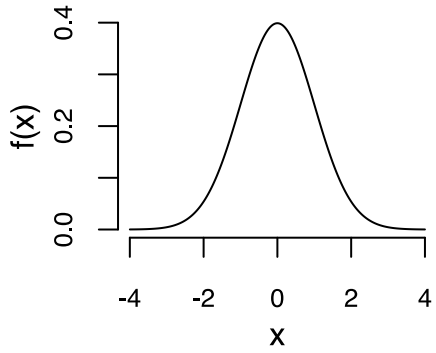

1 / 1 分

6。

If $X \sim \text{Uniform}(2, 6)$, what is $P(2 < X \leq 3)$? Round your answer to two decimal places.

0.25

正确回答

This is $\int_2^3 1/4 dx$.

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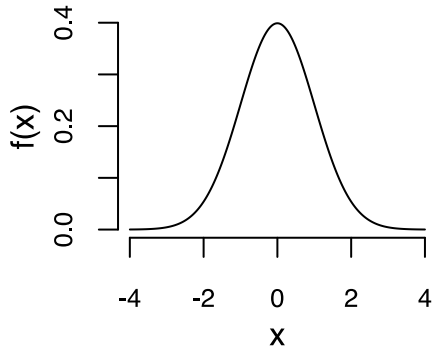
1 / 1 分

11/11 分 (100%)

7。

If $X \sim \mathrm{N}(0,1)$, which of the following is the PDF of X ?

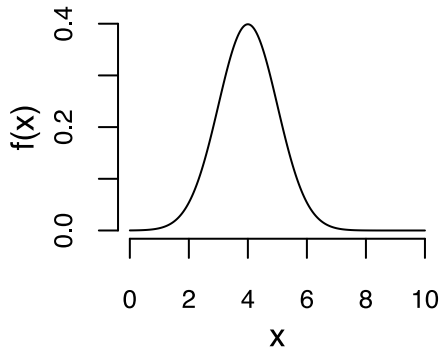
Option:



正确

This is the standard normal distribution.

Option:



Option:

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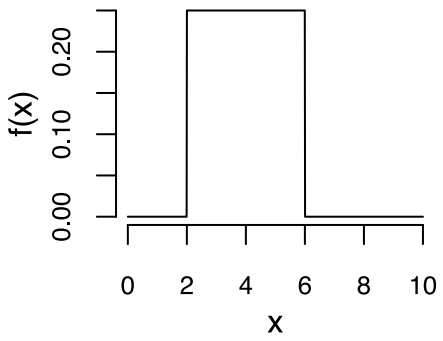

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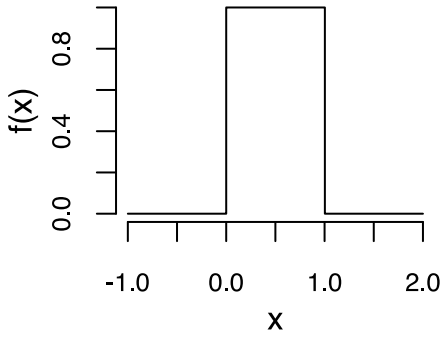

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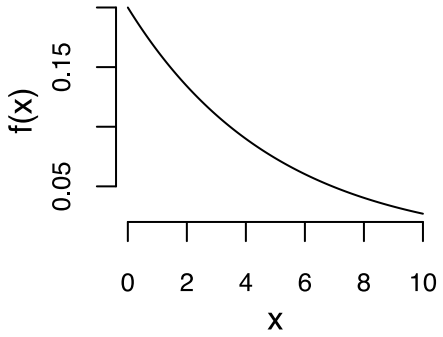

1 / 1 分

8。
If $X \sim \mathrm{N}(2,1)$, what is the expected value of $-5X$? This is denoted as $E(-5X)$.

-10

正确回答
For any number c and any random variable with expectation $E(X)$, we have $E(cX) = cE(X)$.

1 / 1 分

9。
Let $X \sim \mathrm{N}(1,1)$ and $Y \sim \mathrm{N}(4,3^2)$. What is the value of $E(X+Y)$?

5

正确回答
For random variables X and Y with expectations $E(X)$ and $E(Y)$, we always have $E(X+Y) = E(X) + E(Y)$.

1 / 1 分

10。
The normal distribution is also linear in the sense that if $X \sim \mathrm{N}(\mu, \sigma^2)$, then for any real constants $a \neq 0$ and b , the distribution of $Y = aX + b$ is distributed $\mathrm{N}(a\mu + b, a^2\sigma^2)$.

Using this fact, what is the distribution of $Z = \frac{X-\mu}{\sigma}$?

- $\mathrm{N}(\mu, \sigma)$
- $\mathrm{N}(\mu/\sigma, 1)$
- $\mathrm{N}(1, \sigma^2)$

$\mathrm{N}(\mu, \sigma^2)$

$\mathrm{N}(0, 1)$

正确

Here $a = 1/\sigma$ and $b = -\mu/\sigma$. Subtracting the mean and dividing by the standard deviation is referred to as standardizing a random variable.

1 / 1 分

11。

Which of the following random variables would yield the highest value of $P(-1 < X < 1)$?

Hint: Random variables with larger variance are more dispersed.

$X \sim \mathrm{N}(0, 0.1)$

正确

Of the four options, this is the least dispersed, meaning that most of the probability is associated with small values of X .

$X \sim \mathrm{N}(0, 1)$

$X \sim \mathrm{N}(0, 10)$

$X \sim \mathrm{N}(0, 100)$

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