Lesson 3.2-3.3

Quiz, 11 questions

8/11 points (72%)

Try again once you are ready.

Required to pass: 75% or higher

You can retake this quiz up to 4 times every 8 hours.

Back to Week 1

Retake

1/1 points

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

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

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

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

0/1 points

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

.31

Incorrect Response
Recall that for $X \sim \mathrm{Uniform}(0, 1)$, the PDF $f(x) = 0$ for any values of x less than 0 or greater than 1.

1 / 1
points

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

0.2

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

0 / 1
points

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

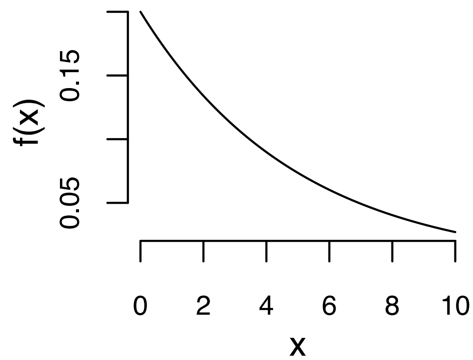
This should not be selected
This is a positive, continuous quantity. However, it is not the most appropriate option available since it is the sum of 5000 random variables, which by the central limit theorem CLT could be approximated with a normal distribution.

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

1 / 1 points

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

Option:



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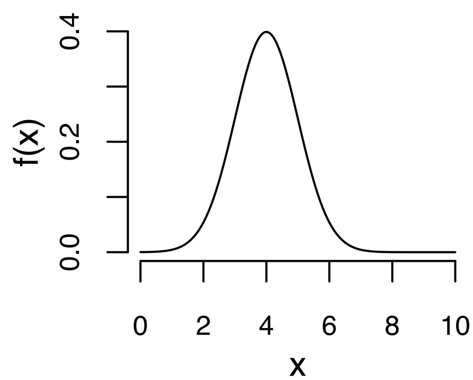

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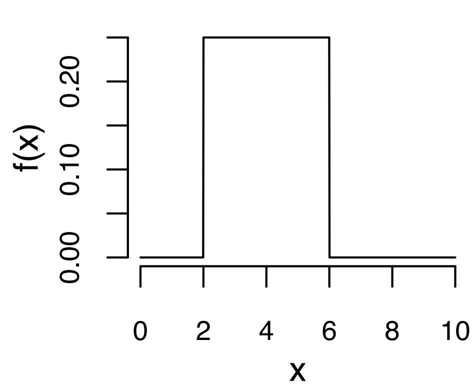
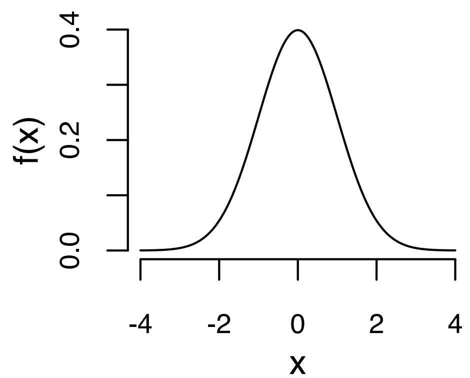


Correct
This PDF has uniform value (1/4) over the interval $[2, 6]$ and is 0 everywhere else.

Option:



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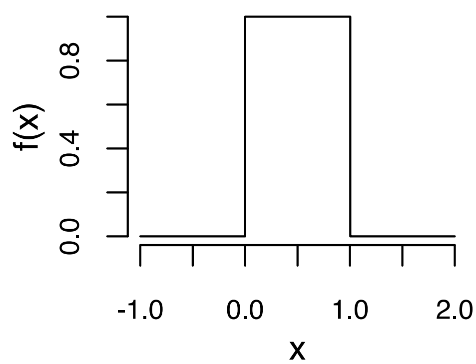

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1 / 1 points

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

.25

Correct Response

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

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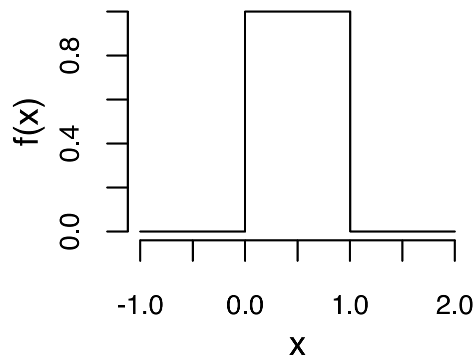
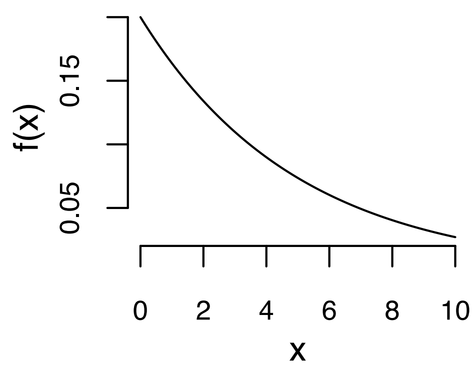
7. If $X \sim \mathrm{N}(0,1)$, which of the following is the PDF of X?

1 / 1 points

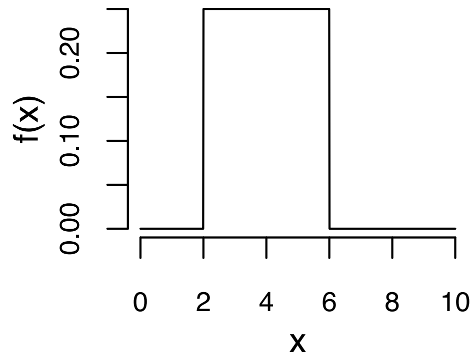
- Option:



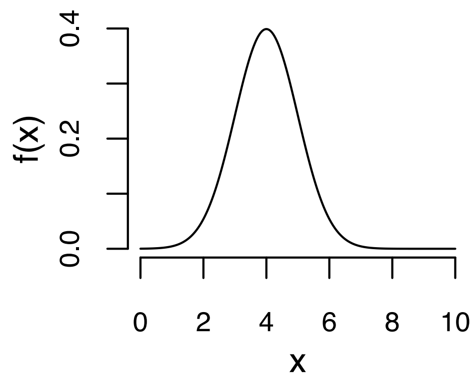
- Option:



- Option:



Option:



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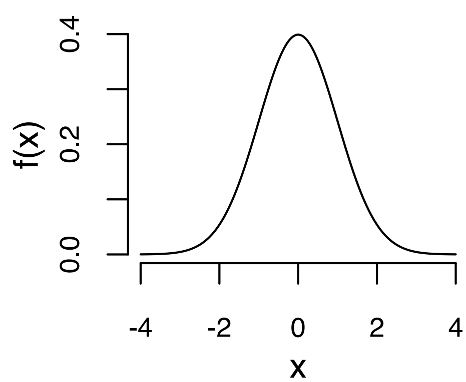

Correct

This is the standard normal distribution.

1 / 1 points

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

-10

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

1 / 1 points

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

Correct Response
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 points

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 $Z = \frac{X-\mu}{\sigma}$?

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

$N(0,1)$

Correct

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.

$N(\mu/\sigma, 1)$

$N(\mu, \sigma)$

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0 / 1 points

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.

$X \sim N(0, 0.1)$

$X \sim N(0, 1)$

$X \sim N(0, 10)$

$X \sim N(0, 100)$

This should not be selected

Of the four options, this is the most dispersed, and will yield the smallest value of $P(-1 < X < 1)$.