

Worksheet: Continuous Random Variables



Q1: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{4x + k}{21} & \text{if } 3 \leq x \leq 4, \\ 0 & \text{otherwise.} \end{cases}$$



Question Video

Find the value of k .

- A 9
- B 8
- C 6
- D 7

Q2: Let X be a continuous random variable with the probability density function

$$f(x) = \begin{cases} \frac{x}{8} & \text{if } 2 < x < 3, \\ \frac{1}{48} & \text{if } 3 < x < 36, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(11 \leq x \leq 24)$.

- A $\frac{13}{48}$
- B $\frac{1,287}{16}$
- C 7
- D $\frac{1}{4}$

Q3: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{1}{8}(6x - 7) & \text{if } 2 \leq x \leq 3, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(2 \leq X \leq 2.5)$.

- A $\frac{13}{16}$
- B $\frac{19}{32}$
- C $\frac{13}{32}$
- D 0

Q4: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{1}{6}(x - 5) & \text{if } 7 \leq x \leq 9, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(X \leq 8)$.

- A $\frac{5}{12}$
- B $\frac{1}{2}$
- C $\frac{3}{4}$
- D 0

Q5: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{x+k}{54} & \text{if } 1 \leq x \leq 7, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(X > 4)$.

- A $\frac{11}{12}$
- B $\frac{1}{6}$
- C $\frac{7}{12}$
- D $\frac{10}{27}$

Q6: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{1}{24}(12-x) & \text{if } 5 \leq x \leq 11, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(X > 7.5)$.

- A $\frac{77}{192}$
- B $\frac{65}{192}$
- C $\frac{39}{64}$
- D $\frac{65}{24}$

Q7: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{a}{62}x & \text{if } 30 \leq x \leq 32, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(30.5 \leq x \leq 31.5)$.

A $\frac{127}{496}$

B $\frac{1}{2}$

C $\frac{375}{496}$

D $\frac{121}{496}$

Q8: Let X be a continuous random variable with the probability density function

$$f(x) = \begin{cases} \frac{a}{8}x & \text{if } 39 \leq x \leq 41, \\ 0 & \text{otherwise.} \end{cases}$$

Find the value of a .

A $\frac{9}{10}$

B $\frac{1}{5}$

C 10

D $\frac{1}{10}$

Q9: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{7x+4}{k} & \text{if } 3 \leq x \leq 5, \\ 0 & \text{otherwise.} \end{cases}$$

Find the value of k .

- A 64
- B 4
- C 10
- D 7

Q10: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{2}{25}x + k & \text{if } 1 \leq x \leq 5, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(3 \leq x \leq 4)$.

- A $\frac{33}{100}$
- B $\frac{29}{100}$
- C $\frac{9}{100}$
- D $\frac{1}{4}$

Q11: Let X be a continuous random variable with the probability density function

$$f(x) = \begin{cases} \frac{1}{63} & \text{if } 9 \leq x \leq 72, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(X > 64)$.

A $\frac{8}{63}$

B $\frac{4}{63}$

C $\frac{16}{63}$

D $\frac{55}{63}$

Q12: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} ax & \text{if } 1 \leq x \leq 5, \\ 0 & \text{otherwise.} \end{cases}$$

Determine the value of a .

A 12

B $\frac{1}{6}$

C $\frac{11}{12}$

D $\frac{1}{12}$

Q13: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{1}{28}x + k & \text{if } 9 \leq x \leq 11, \\ 0 & \text{otherwise.} \end{cases}$$

Find the value of k .

A $\frac{1}{21}$

B 4

C $\frac{1}{7}$

D $\frac{3}{4}$

Q14: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{1}{18}(9 - x) & \text{if } 3 \leq x \leq 9, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(4.5 \leq X \leq 7)$.

A $\frac{65}{144}$

B 1

C $\frac{1}{9}$

D $\frac{7}{16}$

Q15: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{x+2}{24} & \text{if } 2 \leq x \leq 6, \\ 0 & \text{otherwise.} \end{cases}$$

Given $P(a \leq X \leq a+2) = \frac{5}{12}$ and $a \in [2, 6]$, determine the value of a .

A 2

B 3

C 4

D 7

Q16: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{6x+16}{37} & \text{if } 3 \leq x \leq 4, \\ 0 & \text{otherwise.} \end{cases}$$

Given $P(X \leq a) = \frac{71}{148}$ and $a \in [3, 4]$, determine the value a .

A 4.5

B 2.5

C 3

D 3.5

Q17: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{1}{2}(x-3) & \text{if } 3 \leq x \leq 5, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(X > 4.5)$.

A $\frac{33}{16}$

B $\frac{15}{16}$

C $\frac{3}{4}$

D $\frac{7}{16}$

Q18: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{x}{45} & \text{if } 6 < x < 9, \\ \frac{1}{50} & \text{if } 9 < x < 34, \\ 0 & \text{otherwise.} \end{cases}$$

Given that $P(13 < X < a) = \frac{13}{50}$, find the value of a .

A 26

B 34

C 25

D 27

Q19: Let X be a continuous random variable with the probability density function

$$f(x) = \begin{cases} \frac{7x+2}{k} & \text{if } 2 \leq x \leq 4, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(2 \leq x \leq 2.5)$.

- A 0
- B $\frac{297}{368}$
- C $\frac{71}{368}$
- D $\frac{71}{736}$

Q20: Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{1}{40} & \text{if } 3 \leq x \leq 43, \\ 0 & \text{otherwise.} \end{cases}$$

Find $P(X = 37)$.

- A $\frac{3}{10}$
- B $\frac{3}{20}$
- C $\frac{17}{20}$
- D $\frac{1}{40}$

Q21: Let x be a continuous random variable with probability density function

$$f(x) = \begin{cases} k & \text{if } 5 \leq x \leq 33, \\ 0 & \text{otherwise.} \end{cases}$$

Find the value of k .

A $\frac{27}{28}$

B $-\frac{1}{28}$

C $\frac{1}{28}$

D $\frac{1}{56}$

Q22: Calculate the probability density function at $x = 1$ for an exponential distribution with $\lambda = 1$.

A 0.5783

B 0.3679

C 0.1825

D 0.1120

Q23: Let Z be a standard normal random variable. Determine k , given that $P(-2.98 \leq Z \leq k) = 0.7074$.

A 0.65

B -0.65

C 0.55

D -0.55

Q24: Suppose that Z is a standard normal random variable. Given that $P(Z \geq k) = 0.4483$, find k using the standard normal distribution table.

A 0.13

B 0.03

C 0.24

D 0.23

Q25: Suppose Z is a standard normal random variable. Given $P(Z \leq k) = 0.9922$, find the value of k .

A -2.42

B 2.52

C 2.42

D -2.52