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Marks 22.00/25.00

Grade 8.80 out of 10.00 (88%)

Question 1

Correct

Mark 1.00 out of 1.00

Suppose that X has the probability density function $f(x) = 1.5x^2$ for $-1 < x < 1$. Determine $P(-0.5 < X < 0.5)$.

- ☐ a. 5.4
- ☐ b. 1
- ☐ c. 2.35
- ☒ d. 0.125



$$= \int_{-0.5}^{0.5} f(x) dx$$

$$= \int_{-0.5}^{0.5} 1.5x^2 dx$$

$$= \left. -\frac{1}{2}x^3 \right|_{-0.5}^{0.5}$$

$$P(0.5 < X < 3)$$

$$= \int_{0.5}^1 f(x) dx$$

Question **2**

Correct

Mark 1.00 out of 1.00

The manufacturing of semiconductor chips produces 2% defective chips. Assume the chips are independent and that a lot contains 1000 chips. Approximate the probability that more than 25 chips are defective. Let $P(Z \leq 1.24)=0.893$; $P(Z \leq 1.42)=0.922$.

- ☐ a. None of the others
- ☐ b. 0.893
- ☐ c. 0.078
- ☒ d. 0.107
- ☐ e. 0.929



The correct answer is: 0.107

Question **3**

Correct

Mark 1.00 out of 1.00

In the textile industry, a manufacturer is interested in the number of blemishes or flaws occurring in each 100 feet of material. The probability distribution that has the greatest chance of applying to this situation is the

- ☒ a. Poisson distribution
- ☐ b. uniform distribution
- ☐ c. binomial distribution
- ☐ d. normal distribution



Your answer is correct.

The correct answer is:
Poisson distribution

Question **4**

Incorrect

Mark 0.00 out of 1.00

Let X be a continuous random variable with expected value $E(X) = 10$ and variance $V(X) = 4$. Find $E(X^2)$.

- ☐ a. None of the others
- ☐ b. 104
- ☐ c. 6
- ☒ d. 14
- ☐ e. 96



Your answer is incorrect.

The correct answer is:

104

Question 5

Correct

Mark 1.00 out of 1.00

$$F(x) = 1 - e^{-5x} = \int_0^x f(x) dx \quad (x > 0)$$

Let X be a continuous random variable that has the cumulative distribution function given by

$$F(x) = 0, x \leq 0$$

$$F(x) = 1 - e^{-5x}, x > 0$$

Find the density function of X.

(i) $f(x) = 0, x \leq 0$ and $f(x) = 5e^{-5x}, x > 0$

(ii) $f(x) = 1, x \leq 0$ and $f(x) = 5e^{-5x}, x > 0$

(iii) $f(x) = 0, x \leq 0$ and $f(x) = 1 + e^{-5x}, x > 0$

(iv) $f(x) = 0, x \leq 0$ and $f(x) = 1 - e^{-5x}, x > 0$

$$F(x) = \begin{cases} 0, & x \leq 0 \\ 1 - e^{-5x}, & x > 0 \end{cases}$$

$$\Rightarrow f(x) = 0, x \leq 0$$

$$f(x) = \frac{d}{dx} F(x) = 5e^{-5x}, x > 0 \quad \checkmark$$

- ☐ a. (iv)
- ☐ b. (ii)
- ☐ c. None of the other choices is correct
- ☒ d. (i)
- ☐ e. (iii)

Your answer is correct.

The correct answer is:

(i)

Question **6**

Correct

Mark 1.00 out of 1.00

The continuous random variable X has probability density function is $f(x)=2e^{-2x}$, $x>0$. Find $P(X=2015)$.

- ☐ a. 1
- ☐ b. None of others
- ☒ c. 0
- ☐ d. $1/e^{2010}$
- ☐ e. $1/e^{2030}$



The correct answer is: 0

Question 7

Incorrect

Mark 0.00 out of 1.00

Let X be a continuous uniform distribution over the interval $[2.4; 5.2]$. Find the mean and standard deviation of X .

- ☒ a. 3.8 and 0.653
- ☐ b. 3.8 and 0.808
- ☐ c. None of the others.
- ☐ d. 0.38 and 0.653



The correct answer is: 3.8 and 0.808

Question 8

Correct

Mark 1.00 out of 1.00

An engineering professional body estimates that 70% of the students taking undergraduate engineering courses are in favour of studying of statistics as part of their studies. If this estimate is correct, use the normal formula for Binomial distributions to approximate the probability that more than 700 undergraduate engineers out of a random sample of 1000 will be in favour of studying statistics. Let $P(Z < 0.035) = 0.514$; $P(Z < 0) = 0.5$.

- ☐ a. None of the other choices is correct
- ☐ b. 0.5
- ☐ c. 0.514
- ☐ d. 0.643
- ☒ e. 0.486



Your answer is correct.

The correct answer is:
0.486

Question 9

Correct

Mark 1.00 out of 1.00

If x is a normally-distributed random variable with a mean of 100 and a standard deviation of 15, what is $p(x < 115)$?

- ☐ a. 0.8813
- ☐ b. 0.7113
- ☒ c. 0.8413
- ☐ d. 0.9113



Your answer is correct.

The correct answer is:
0.8413

Question **10**

Correct

Mark 1.00 out of 1.00

A probability density function is given by
 $f(x) = \frac{b}{x^2}$ when $1 < x < 5$. What is the value
of b ?

- ☐ a. None of the other choices is correct
- ☐ b. 2.5
- ☐ c. 4
- ☒ d. 1.25
- ☐ e. 2



Your answer is correct.

The correct answer is:
1.25

Question 11

Correct

Mark 1.00 out of 1.00

Suppose the cumulative distribution function of the random variable X is

$$F(x) = \begin{cases} 0 & x < 0 \\ 0.2x & 0 \leq x < 4 \\ 0.04x + 0.64 & 4 \leq x < 9 \\ 1 & 9 \leq x \end{cases}$$

Determine $P(X < 3)$.

- ☒ a. 0.6
- ☐ b. 0.76
- ☐ c. None of the other choices is correct
- ☐ d. 1
- ☐ e. 0



Your answer is correct.

The correct answer is:
0.6

Question 12

Correct

Mark 1.00 out of 1.00

A study of the amount of time it takes a mechanic to rebuild the transmission for a 1992 Chevrolet Cavalier shows that the mean is 8.4 hours and the standard deviation is 1.8 hours. If 40 mechanics are randomly selected, find the probability that their mean rebuild time exceeds 8.7 hours.

Let $P(Z < 0.86) = 0.8054$

$P(Z < 1.05) = 0.8531$

$P(Z < 1.10) = 0.8654$

$P(Z < 1.13) = 0.8715$

- ☐ a. 0.1285
- ☐ b. 0.1946
- ☐ c. None of the other choices is correct
- ☒ d. 0.1469
- ☐ e. 0.1346

$\sigma = 1.8$ $\mu = 8.4$

$$P(\bar{x} > 8.7)$$

$$= P\left(\frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}} > \frac{8.7 - \mu_{\bar{x}}}{\sigma_{\bar{x}}}\right)$$

$$= P\left(Z > \frac{8.7 - 8.4}{\frac{1.8}{\sqrt{40}}}\right)$$

Your answer is correct.

The correct answer is:
0.1469

Question **13**

Correct

Mark 1.00 out of 1.00

A continuous uniform random variable x has a lower bound of $a = -3$, an upper bound of $b = 5$. What is $p(x > -1)$?

- ☒ a. 0.75
- ☐ b. 0.5
- ☐ c. 0.25
- ☐ d. 0.125



Your answer is correct.

The correct answer is:
0.75

Question **14**

Incorrect

Mark 0.00 out of 1.00

For a continuous random variable x , the probability density function $f(x)$ represents

- ☐ a. the area under the curve to the right of x
- ☒ b. the area under the curve at x
- ☐ c. the probability at a given value of x
- ☐ d. the height of the function at x



Your answer is incorrect.

The correct answer is:
the height of the function at x

Question **15**

Correct

Mark 1.00 out of 1.00

Let X be a uniform random variable over the interval $[1, 9]$. What is the probability that the random variable X has a value less than 6?

- ☐ a. None of the other choices is correct
- ☐ b. 0.875
- ☐ c. 0.500
- ☒ d. 0.625
- ☐ e. 0.400



Your answer is correct.

The correct answer is:
0.625

Question **16**

Correct

Mark 1.00 out of 1.00

Let X be a random variable with density function

$$f(x) = \begin{cases} \frac{x^2}{3} & \text{if } -1 < x < 2, \\ 0 & \text{elsewhere} \end{cases}$$

Find the expected value of $Y = 4X + 3$.

- ☐ a. 9
- ☐ b. None of the other choices is correct
- ☐ c. 10
- ☐ d. 7
- ☒ e. 8



Your answer is correct.

The correct answer is:

8

Question **17**

Correct

Mark 1.00 out of 1.00

If z is the standard normal random variable, what is $p(z > -1.787)$?

- ☐ a. 0.8530
- ☒ b. 0.9630
- ☐ c. 0.8230
- ☐ d. 0.7730



Your answer is correct.

The correct answer is:
0.9630

Question **18**

Correct

Mark 1.00 out of 1.00

If x is a normally-distributed random variable with a mean of 78 and a standard deviation of 12, what is $p(67 < x < 81)$?

- ☐ a. 0.4790
- ☒ b. 0.4190
- ☐ c. 0.4590
- ☐ d. 0.3890



Your answer is correct.

The correct answer is:
0.4190

Question **19**

Correct

Mark 1.00 out of 1.00

A continuous uniform random variable x has a lower bound of $a = -21$, an upper bound of $b = -6$. What value of x provides an area in the upper tail equal to 0.20?

- ☐ a. -12
- ☒ b. -9
- ☐ c. -18
- ☐ d. -15



Your answer is correct.

The correct answer is:
-9

Question 20

Correct

Mark 1.00 out of 1.00

Let X represent the amount of time it takes a student to park in the library parking lot at the university. If we know that the distribution of parking times can be modelled using an exponential distribution with a mean of 4 minutes, find the probability that it will take a randomly selected student more than 10 minutes to park in the library lot.

- ☐ a. 0.670320
- ☐ b. 0.329680
- ☐ c. None of the other choices is correct
- ☒ d. 0.082085
- ☐ e. 0.917915

$$P(X > 10) = 1 - P(X \leq 10)$$

$$= 1 - \int_0^{10} \frac{1}{4} e^{-\frac{1}{4}x} dx$$

Your answer is correct.

The correct answer is:
0.082085

Question **21**

Correct

Mark 1.00 out of 1.00

If z is the standard normal random variable, what is $p(z < 0.275)$?

- ☐ a. 0.5683
- ☒ b. 0.6083
- ☐ c. 0.6983
- ☐ d. 0.7983



Your answer is correct.

The correct answer is:
0.6083

Question **22**

Correct

Mark 1.00 out of 1.00

A salesperson knows that 20% of her presentations result in sales. Use the normal approximation formula for the Binomial distribution to find the probabilities that in the next 60 presentations at least 9 result in sales.

Let $P(Z < -1.13) = 0.1268$ and $P(Z < -0.81) = 0.2089$.

- ☐ a. None of the other choices is correct
- ☒ b. 0.8732
- ☐ c. 0.6421
- ☐ d. 0.7911
- ☐ e. 0.1241



Your answer is correct.

The correct answer is:
0.8732

Question **23**

Correct

Mark 1.00 out of 1.00

If z is the standard normal random variable, what is $p(-1.5 < z < 1.125)$?

- ☐ a. 0.7329
- ☐ b. 0.8329
- ☐ c. 0.6929
- ☒ d. 0.8029



Your answer is correct.

The correct answer is:
0.8029

Question **24**

Correct

Mark 1.00 out of 1.00

At a computer manufacturing company, the actual size of computer chips is normally distributed with a mean of 1 centimeter and a standard deviation of 0.1 centimeter. A random sample of 12 computer chips is taken. What is the probability that the sample mean will be below 0.95 centimeters?

Let $P(Z < -1.73) = 0.04$, $P(Z < -0.34) = 0.36$ and $P(Z < 0) = 0.5$.

- ☐ a. 0.64
- ☐ b. 0.96
- ☐ c. None of the other choices is correct
- ☒ d. 0.04
- ☐ e. 0.36



Your answer is correct.

The correct answer is:
0.04

Question **25**

Correct

Mark 1.00 out of 1.00

The continuous random variable X has probability density function is $f(x)=e^{-x}$, $x>0$. Find $P(X=2010)$.

- ☐ a. None of the others.
- ☐ b. 1
- ☒ c. 0
- ☐ d. $1/e^{-2010}$



The correct answer is: 0

