

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) A set of exam scores is 80, 75, 85, 90, 100, 70, 60. The standard deviation equals 1) _____
- A) 7
 B) $\sqrt{10}$
 C) $\sqrt{50}$
 D) $\sqrt{20}$
 E) none of these

- 2) The table below is the probability table for a random variable X. Find $E(X)$, $\text{Var}(X)$, and the standard deviation of X. 2) _____

Outcome	-2	-1	0	1	2
Probability	0.2	0.35	0.15	0.05	0.25

- A) $E(X) = -0.2$; $\text{Var}(X) = 4$; standard deviation of X = 2
 B) $E(X) = -0.2$; $\text{Var}(X) = 2.22$; standard deviation of X = 1.49
 C) $E(X) = -0.2$; $\text{Var}(X) = 0$; standard deviation of X = 0
 D) $E(X) = -0.2$; $\text{Var}(X) = 2.16$; standard deviation of X = 1.47
 E) none of these

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 3) The table below is the probability table for a random variable X. Find $E(X)$. 3) _____

Outcome	-1	0	1	2
Probability	$\frac{3}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{2}{7}$

Enter just a reduced fraction of form $\frac{a}{b}$.

- 4) The table below is the probability table for a random variable X. Find $\text{Var}(X)$. 4) _____

Outcome	-1	0	1	2
Probability	$\frac{3}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{2}{7}$

Enter just a reduced fraction of form $\frac{a}{b}$.

- 5) The table below is the probability table for a random variable X. Find the standard deviation of X.

5) _____

Outcome	-1	0	1	2
Probability	$\frac{3}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{2}{7}$

Enter just a real number rounded off to two decimal places.

- 6) The table below is the probability table for a random variable X. Find $E(X)$.

6) _____

Outcome	-3	-2	-1	1	2	3
Probability	0.1	0.1	0.4	0.3	0.05	0.05

Enter just a real number rounded off to two decimal places.

- 7) The table below is the probability table for a random variable X. Find $\text{Var}(X)$.

7) _____

Outcome	-3	-2	-1	1	2	3
Probability	0.1	0.1	0.4	0.3	0.05	0.05

Enter just a real number rounded off to two decimal places.

- 8) The table below is the probability table for a random variable X. Find the standard deviation of X.

8) _____

Outcome	-3	-2	-1	1	2	3
Probability	0.1	0.1	0.4	0.3	0.05	0.05

Enter just a real number rounded off to two decimal places.

- 9) The table below is the probability table for a random variable X. Find $E(X)$, $\text{Var}(X)$, and the standard deviation of X.

9) _____

Outcome	40	50	60	70	80
Probability	0.3	0.15	0.15	0.2	0.2

Enter just three real numbers all rounded off to two decimal places: a, b, c representing the three quantities in the order requested above, separated by commas (no labels).

- 10) A car dealer records the number of Mercedes sold each week. During the past 50 weeks, there were 15 weeks with no sales, 20 weeks with one sale, 10 weeks with two sales, and 5 weeks with three sales. Let X be the number of Mercedes sold in a week selected at random from the past 50 weeks. Compute $E(X)$. Enter just a real number rounded off to one decimal place (no label).

10) _____

- 11) A student taking five courses keeps a record of the number of assignments due each day in all her courses. Over the course of the 60-day semester she finds on 20 days no assignments are due, on 15 days an assignment is due in one course, on 15 days an assignment is due in two courses, on 9 days an assignments is due in three courses and once during the semester she has an assignment due in 4 courses. If X is the number of assignments due on a day selected at random from the semester, find $E(X)$.

11) _____

Is $E(X) = 0 \cdot \frac{1}{3} + 1 \cdot \frac{1}{4} + 2 \cdot \frac{1}{4} + 3 \cdot \frac{3}{20} + 4 \cdot \frac{1}{60}$ the correct answer?

Enter "yes" or "no".

- 12) The riders of the New Town Elementary school bus consists of 5 five year olds, 3 six year olds, 10 eight year olds, 1 nine year old, 4 eleven year olds and a twelve year old. A child is selected at random and her age is noted. Let X be the outcome. Find $E(X)$. Enter just a reduced fraction of form $\frac{a}{b}$ (no label). 12) _____
- 13) A carnival game costs \$2 to play. A player draws a ball at random from a sack containing 1 white ball, 2 blue balls, 3 red balls, and 4 yellow balls. The payoff for drawing a particular color ball is as follows: white pays \$5, blue pays \$4, red pays \$3 and yellow pays nothing. If X is the amount of money a player wins. Calculate $E(X)$. Enter just a real number rounded off to two decimal places (no label). 13) _____
- 14) John would like to place a two dollar bet on his favorite racehorse, Black Velvet. He can bet that Black Velvet will win or show (finish in the top three horses). If he bets correctly that Black Velvet wins, he wins \$20. If he bets correctly that Black Velvet shows, he wins \$7. John figures Black Velvet has a 20% chance of winning and a 70% chance of showing. If X is the amount of money John wins if he bets Black Velvet will win and Y is the amount of money he wins if Black Velvet will show, find $E(X)$ and $E(Y)$. Enter just two real numbers rounded off to two decimal places in the order given above representing dollars (no units). 14) _____
- 15) A Christmas tree grower anticipates a profit of \$80,000 in a usual season. There is however a 10% chance of pine bark beetle infestation in which case 70% of the trees are destroyed and profit is reduced to \$24,000. The grower can spray for beetles at the beginning of the season at a cost of \$7,000. Compute $E(X)$. Enter just an integer rounded off to the nearest thousand. 15) _____
- 16) Joe has a lawn mowing job. If he completes the work he earns \$40. But there is a 30% chance it may rain, in which case he won't finish the job. He can pay Jane \$20 to help him and ensure that he finishes the job. If X is the amount Joe will get if he does not get Jane to help, calculate $E(X)$ and thus decide whether Joe should hire Jane or not. (If it rains, assume Joe will make no money and if Joe hires Jane assume they will be able to finish the job before it rains. Enter your answer exactly as a,b where a is an integer representing $E(X)$ in dollars (no units), and b is either "yes" or "no" answering the question "should Joe hire Jane?", separated by a comma. 16) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the function is a probability density function over the given interval.

- 17) $f(x) = \frac{1}{4}, 8 \leq x \leq 12$ 17) _____
 A) Yes B) No
- 18) $f(x) = \frac{1}{2}, 4 \leq x \leq 10$ 18) _____
 A) No B) Yes

19) $f(x) = 5x, 0 \leq x \leq 1$

A) No

B) Yes

19) _____

20) $f(x) = \frac{1}{2}x, 0 \leq x \leq 2$

A) No

B) Yes

20) _____

21) $f(x) = \frac{1}{4}x, 4 \leq x \leq 7$

A) Yes

B) No

21) _____

22) $f(x) = \frac{3}{31}x^2, 1 \leq x \leq 4$

A) Yes

B) No

22) _____

23) $f(x) = \frac{1}{9}x^2, 0 \leq x \leq 3$

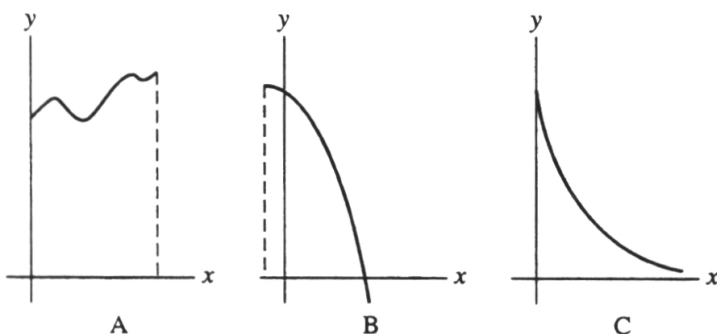
A) Yes

B) No

23) _____

24) Which of the graphs below could not possibly be the graph of a probability function $f(x)$?

24) _____



A) graphs A and B

B) graphs B and C

C) graphs A and C

D) graph B only

E) none of these

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

25) Is $f(x) = \frac{1}{21}x^2$ a probability density function on the interval $1 \leq x \leq 4$?

25) _____

Enter "yes" or "no".

26) Is $f(x) = \frac{1}{(x+1)^2}$ is a probability density function for $x \geq 0$? If so, find $P(X \geq 2)$. 26) _____

Enter either "no" or just a reduced fraction of form $\frac{a}{b}$.

27) Is $f(x) = \left(\frac{3}{2}\right)x - 1$ a probability density function for $0 \leq x \leq 2$? 27) _____

Enter "yes" or "no"

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find k such that the function is a probability density function over the given interval. Then write the probability density function.

28) $f(x) = k$; $-2 \leq x \leq 4$ 28) _____

- A) $\frac{1}{6}$; $f(x) = \frac{1}{6}$ B) 6; $f(x) = 6$ C) -2; $f(x) = -2$ D) $-\frac{1}{2}$; $f(x) = -\frac{1}{2}$

29) $f(x) = k(14 - x)$; $0 \leq x \leq 14$ 29) _____

- A) 14; $f(x) = 14(14 - x)$ B) $\frac{1}{98}$; $f(x) = \frac{1}{98}(14 - x)$
C) 196; $f(x) = 196(14 - x)$ D) $\frac{1}{196}$; $f(x) = \frac{1}{196}(14 - x)$

30) $f(x) = \frac{k}{x}$; $1 \leq x \leq 17$ 30) _____

- A) $1 - \ln 17$; $f(x) = \frac{x}{1 - \ln 17}$ B) $\ln 17$; $f(x) = x \ln 17$
C) $\frac{1}{\ln 17}$; $f(x) = \frac{1}{x \ln 17}$ D) $\frac{2}{\ln 17}$; $f(x) = \frac{2}{x \ln 17}$

31) Find the value of k that makes $f(x) = kx$ a probability function on the interval $1 \leq x \leq 2$. 31) _____

- A) $\frac{2}{3}$
B) $\frac{6}{5}$
C) $\frac{2}{5}$
D) $\frac{4}{5}$
E) none of these

- 32) A random variable X has probability density function $f(x) = ke^{-kx}$ ($x \geq 1$) for some constant k . 32) _____
Suppose that $\Pr(1 \leq X \leq 2) = \frac{1}{4}$, what is the value of k ?
- A) $\frac{1}{2} \ln 2$
B) $\frac{1}{4}$
C) $\frac{3}{2} \ln 2$
D) $\ln 2$
E) none of these

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 33) Find the value of k that makes $f(x) = kx^3$ a probability density function on the interval $0 \leq x \leq 1$. 33) _____
Enter just an integer.
- 34) Find the value of k that makes $f(x) = k\sqrt{x}$ a probability density function on the interval $4 \leq x \leq 9$. 34) _____
Enter just a reduced fraction.
- 35) Find the value of k that makes $f(x) = kx^2$ a probability density function on the interval $0 \leq x \leq 1$. 35) _____
Enter just an integer.
- 36) Find the value of k that makes $f(x) = 3e^{-kx}$ a probability density function on the interval $x \geq 0$. 36) _____
Enter just an integer.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

37) A random variable X has a cumulative distribution function $F(x) = 1 - \frac{1}{x^2}$ ($x \geq 1$). Find $\Pr(a \leq X \leq$ 37) _____

5).

A) $\frac{24}{25} - \frac{1}{a^2}$

B) $1 - \frac{1}{a^2}$

C) $\frac{1}{a^2}$

D) $\frac{1}{a^2} - \frac{1}{25}$

E) none of these

38) Let X be a continuous random variable with a cumulative distribution function 38) _____

$F(x) = 1 - e^{-x^2}$ ($x \geq 0$). Find $\Pr(1 \leq X \leq 2)$.

A) $e^{-1} - e^{-2} - 2$

B) $e^{-1} - e^{-2}$

C) $1 - e^{-1} - e^{-2}$

D) $e^{-1} - e^{-4}$

E) none of these

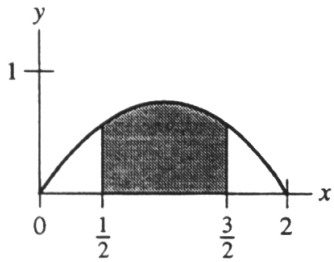
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

39) The probability density function for a random variable X is $f(x) = 3x^{-4}$, $x \geq 1$. Find 39) _____
 $\Pr(2 \leq X)$.
 Enter just a reduced fraction.

40) The probability density function for a random variable X is $f(x) = \frac{3}{4}(2x - x^2)$, $0 \leq x \leq 2$. 40) _____
 Find $\Pr(0 \leq X \leq 1)$.
 Enter just a reduced fraction.

41) The probability density function for a random variable X is $f(x) = \frac{2 \ln x}{(\ln 4)^2 x}$, $1 \leq x \leq 4$. Find 41) _____
 $\Pr(1 \leq X \leq 2)$.
 Enter just a reduced fraction.

- 42) The probability density function of a continuous random variable X is $f(x) = \frac{3}{2}x - \frac{3}{4}x^2$, 42) _____
 $0 \leq x \leq 2$. Is this the graph of $f(x)$ with the shaded area corresponding to $\Pr\left\{\frac{1}{2} \leq x \leq \frac{3}{2}\right\}$?



Enter "yes" or "no".

- 43) If $f(x) = \frac{1}{8}x$ is a probability density function for $0 \leq x \leq 4$, find $F(x)$, the corresponding 43) _____
cumulative distribution function and use it to find $\Pr(1 \leq X \leq 3)$.
Enter just a reduced fraction representing $\Pr(1 \leq X \leq 3)$. Do not label.

- 44) If $f(x) = 6x(1 - x)$ is a probability density function for $0 \leq x \leq 1$, find $F(x)$, the corresponding 44) _____
cumulative distribution function and use it to find $\Pr\left\{\frac{1}{2} \leq X \leq 1\right\}$.
Enter just a reduced fraction representing $\Pr\left\{\frac{1}{2} \leq X \leq 1\right\}$. Do not label.

- 45) A random variable X has a cumulative distribution function $F(x) = 1 - \frac{1}{(x+1)^2}$ for $x \geq 0$. 45) _____
Find $\Pr(1 \leq X \leq 4)$.
Enter just a reduced fraction.

- 46) Suppose $f(x) = \frac{1}{x^2}$ is a probability density function for $x \geq 1$. Find $\Pr(2 \leq X \leq 10)$. 46) _____
Enter just a reduced fraction.

- 47) Determine the probability of an outcome of the probability density function $f(x) = 4x^3$ 47) _____
being between $\frac{1}{4}$ and $\frac{1}{2}$ where $0 \leq x \leq 1$.
Enter just a reduced fraction.

- 48) Determine the probability of an outcome of the probability density function 48) _____
 $f(x) = 12x^2 - 12x^3$ being between $\frac{1}{2}$ and 1 where $0 \leq x \leq 1$.
Enter just a reduced fraction.

49) A random variable X has a density function $f(x) = \frac{1}{\ln 16} \cdot \frac{1}{x}$, $1 \leq x \leq 16$. Find a such that $\Pr(1 \leq X \leq a) = \frac{3}{4}$. 49) _____

Enter just an integer, no labels.

50) A random variable X has a density function $f(x) = \frac{24}{x^3}$, $3 \leq x \leq 6$. Find b such that $\Pr(X \leq b) = 0.4$. 50) _____

Enter your answer exactly in the reduced form $a\sqrt{\frac{b}{c}}$, unlabeled.

51) A random variable X has a cumulative distribution function $F(x) = \frac{x}{5} - 2$, $10 \leq x \leq 15$. Find a such that $\Pr(a \leq X \leq 15) = \frac{2}{3}$. 51) _____

Enter just a reduced fraction of form $\frac{a}{b}$.

52) A random variable X has a probability density function $f(x) = \frac{x}{32}$, $0 \leq x \leq 8$. Find a such that $\Pr(X \geq a) = \frac{1}{4}$. 52) _____

Enter your answer exactly in the reduced form $b\sqrt{c}$, unlabeled.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Let X be a continuous random variable $A \leq X \leq B$ and let $f(x)$ be its probability density function and $F(x)$ its cumulative distribution function. Indicate whether the following statements are true or false.

53) $\Pr(a \leq X \leq b) = \int_a^b f(x)dx$ 53) _____

A) True

B) False

54) $f(A) = 0$, $f(B) = 1$ 54) _____

A) True

B) False

55) $F'(x) = f(x)$ 55) _____

A) True

B) False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Missed work hours caused by one of a class of industrial accidents has a probability density function

$$f(t) = \frac{1}{8}e^{-t} + \frac{3}{8}e^{-t/2} + \frac{1}{24}e^{-t/3} \text{ where } t \text{ is measured in hours.}$$

- 56) What proportion of these accidents result in 5 or fewer missed work hours? 56) _____
Enter just a real number to two decimal places.

- 57) What proportion of these accidents result in more than 9 missed work hours? 57) _____
Enter just a real number to two decimal places.

- 58) Dr. Smith's test score distribution is characterized by the probability density function 58) _____
 $f(x) = \frac{x(10,000 - x^2)}{25,000,000}$, $0 \leq x \leq 100$. What percentage of people are likely to get a 60 or above on the exam? Enter just a real number to two decimal places (no units).

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

- 59) A dart is thrown at a number line in such a way that it always lands in the interval $[0, 10]$. Let x be the number the dart hits. Suppose the probability density function for x is given by 59) _____

$$f(x) = \frac{x}{50}, \text{ for } 0 \leq x \leq 10.$$

Find $P(2 \leq x \leq 5)$, the probability that it lands in $[2, 5]$.

- A) 0.42 B) 0.03 C) 0.21 D) 0.09

- 60) A dart is thrown at a number line in such a way that it always lands in the interval $[0, 7]$. Let x be the number the dart hits. Suppose the probability density function for x is given by 60) _____

$$f(x) = \frac{3}{343}x^2, \text{ for } 0 \leq x \leq 7.$$

Find $P(2 \leq x \leq 5)$, the probability that it lands in $[2, 5]$.

- A) 0.34 B) 0.06 C) 0.43 D) 0.03

- 61) A random variable has probability density function $f(x) = 30x^2(1 - x)^2$ ($0 \leq x \leq 1$). Compute its cumulative distribution $F(x)$. 61) _____

- A) $10x^3 - 15x^4 + 6x^5$
B) $30x^2 - 60x^3 + 30x^4$
C) $30x(1 - x)$
D) $10x^3 - 15x^4 + 6x^5 + 1$
E) none of these

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

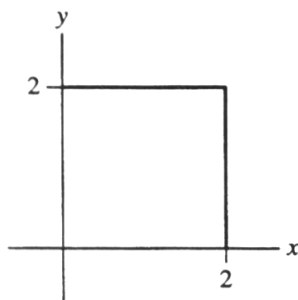
62) Suppose $f(x) = k(x^2 + 2x)$ is a probability density function for a continuous random variable on the interval $0 \leq x \leq 3$. Find the value of k and find the corresponding cumulative distribution function.
Enter just an unlabeled polynomial in x in standard form. 62) _____

63) Suppose $f(x) = kx^{-5}$ is a density function for a random variable x for $x \geq 2$. Find the value of k and find the corresponding cumulative distribution function.
Enter your answer exactly as $a \pm bx^c$. 63) _____

64) Given the probability density function $f(x) = \frac{1}{3}$, determine the corresponding cumulative distribution function where $12 \leq x \leq 15$.
Enter an unlabeled polynomial in x in standard form. 64) _____

65) Given the density function $f(x) = \frac{3}{64}x^2$, $0 \leq x \leq 4$, determine the corresponding cumulative distribution function.
Enter just an unlabeled polynomial in x in standard form. 65) _____

66) Consider a square with sides of length 2 as in the diagram below. An experiment consists of choosing a point at random from the square and noting its x -coordinate. If X is the x -coordinate of the point chosen, find the cumulative distribution function of X . [Recall $F(x) = \Pr(0 \leq X \leq x)$.] 66) _____



Enter just an unlabeled polynomial in x in standard form.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Let X be a continuous random variable $A \leq X \leq B$ and let $f(x)$ be its probability density function and $F(x)$ its cumulative distribution function. Indicate whether the following statements are true or false.

67) $\int_A^B f(x) dx = 1$ 67) _____
A) True B) False

68) $\Pr(A \leq X \leq b) = F(b)$

A) True

B) False

68) _____

For the given probability density function, over the stated interval, find the requested value.

69) $f(x) = \frac{1}{7}$, over the interval $2 \leq x \leq 8$. Find $E(x)$.

69) _____

A) $\frac{59}{14}$

B) 24

C) $\frac{60}{7}$

D) $\frac{30}{7}$

70) $f(x) = \frac{1}{5}x$, over the interval $1 \leq x \leq 3$. Find $E(x)$.

70) _____

A) $\frac{9}{5}$

B) $\frac{1}{2}$

C) $\frac{5}{3}$

D) $\frac{26}{15}$

71) $f(x) = \frac{1}{7}x^2$, over the interval $-2 \leq x \leq 3$. Find $E(x)$.

71) _____

A) $\frac{71}{28}$

B) $\frac{81}{28}$

C) $\frac{65}{28}$

D) $\frac{73}{28}$

72) Find the expected value of the random variable whose density function is $f(x) = \frac{3}{8}x^2$, $0 \leq x \leq 2$.

72) _____

A) $\frac{3}{2}$

B) $\frac{3}{8}$

C) $\frac{5}{8}$

D) $\frac{5}{2}$

E) none of these

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

73) Find the expected value and variance for the random variable whose probability density function is $f(x) = x$, $0 \leq x \leq 1$.
Enter just two reduced fractions (unlabeled) in the order $E(X)$, $\text{Var}(X)$ separated by a comma.

73) _____

74) Find the expected value and variance for the random variable whose probability density function is $f(x) = \frac{1}{3}$, $2 \leq x \leq 5$.

74) _____

Enter just two reduced fractions of form $\frac{a}{b}$ (unlabeled) in the order $E(X)$, $\text{Var}(X)$ separated by a comma.

- 75) Find the expected value and variance for the random variable whose probability density function is $f(x) = 3x^2$, $0 \leq x \leq 1$. Enter just two reduced fractions (unlabeled) in the order $E(X)$, $\text{Var}(X)$ separated by a comma. 75) _____
- 76) Find the expected value and variance for the random variable whose probability density function is $f(x) = 12x^2(1 - x)$, $0 \leq x \leq 1$. Enter just two reduced fractions (unlabeled) in the order $E(X)$, $\text{Var}(X)$ separated by a comma. 76) _____
- 77) Find the expected value and variance for the random variable whose probability density function is $f(x) = 2(x - 1)$, $1 \leq x \leq 2$. Enter just two reduced fractions (unlabeled) in the order $E(X)$, $\text{Var}(X)$ separated by a comma. 77) _____
- 78) Find the expected value and variance for the random variable whose probability density function is $f(x) = e^x$, $x \leq 0$. (You may use the fact that $\lim_{b \rightarrow -\infty} be^b = 0$.) Enter just two integers (unlabeled) in the order $E(X)$, $\text{Var}(X)$ separated by a comma. 78) _____
- 79) Find the expected value and variance for the random variable whose probability density function is $f(x) = 4x - 1$, $\frac{1}{2} \leq x \leq 1$. Enter just two reduced fractions (unlabeled) in the order $E(X)$, $\text{Var}(X)$ separated by a comma. 79) _____
- 80) A hardware store will cut lumber any length between 5 and 20 feet. Say X is the length of lumber requested by a customer. Then X is a uniform random variable with probability density function $f(x) = \frac{1}{15}$. Find $E(X)$ and $\text{Var}(X)$. Enter just two reduced fractions (unlabeled) in the order $E(X)$, $\text{Var}(X)$ separated by a comma. 80) _____
- 81) The life of a battery is a random variable with probability density function $f(x) = \frac{3}{56}x^2$, $2 \leq x \leq 4$ where x is the time in months. Calculate $E(X)$. Enter just a reduced fraction of form $\frac{a}{b}$ unlabeled. 81) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Let X be a continuous random variable on $a \leq x \leq b$ with probability density function $f(x)$. Then the median of the x -values is that number m for which

$$\int_a^m f(x) dx = \frac{1}{2}.$$

Find the median.

82) $f(x) = \frac{1}{8}; 2 \leq x \leq 10$ 82) _____

A) 6

B) 8

C) $\frac{14}{3}$

D) 2

83) $f(x) = \frac{x}{8} - \frac{5}{8}; 5 \leq x \leq 9$ 83) _____

A) 7.83

B) 6.41

C) 7

D) 0.50

84) Suppose X is a normal random variable with density function $f(x) = \frac{1}{\sqrt{2\pi}}e^{(-1/2)(x+4)^2}$. Find the 84) _____

expected value and standard deviation of X .

A) $\mu = 1, \sigma = 16$

B) $\mu = 4, \sigma = 1$

C) $\mu = 1, \sigma = 4$

D) $\mu = -4, \sigma = 16$

E) $\mu = -4, \sigma = 1$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

85) Find (by inspection) the expected value and the variance of the random variables with the 85) _____
following density function: $f(x) = 0.2e^{-0.2x}, x \geq 0$
Enter your answer as just two integers separated by a comma, the first representing $E(X)$
and the second representing $\text{Var}(X)$.

86) Find (by inspection) the expected value and the variance of the random variables with the 86) _____
following density function: $f(x) = \frac{1}{4\sqrt{2\pi}}e^{-(1/2)[(x-1)/4]^2}, -\infty < x < \infty$
Enter your answer as just two integers separated by a comma, the first representing $E(X)$
and the second representing $\text{Var}(X)$.

87) Find (by inspection) the expected value and standard deviation of the random variable 87) _____
with the following density function: $f(x) = e^{-0.1x}$.
Enter your answer as just two integers separated by a comma, the first representing $E(X)$
and the second representing $\sqrt{\text{Var}(X)}$.

88) Find (by inspection) the expected value and standard deviation of the random variable 88) _____
 with the following density function: $f(x) = \frac{1}{2\sqrt{2\pi}}e^{-1/8x^2}$

Enter your answer as just two numbers (integers or reduced fractions) separated by a comma, the first representing $E(X)$ and the second representing $\sqrt{\text{Var}(X)}$.

89) Find (by inspection) the expected value and standard deviation of the random variable 89) _____
 with the following density function: $f(x) = \frac{7}{\sqrt{2\pi}}e^{-49/2(x - 3.9)^2}$

Enter your answer as just two numbers (a real number to one decimal place followed by a reduced fraction) separated by a comma, the first representing $E(X)$ and the second representing $\sqrt{\text{Var}(X)}$.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

90) A random variable X is exponentially distributed with a mean of 2. Find $\Pr(1 \leq X \leq 3)$. 90) _____
 A) $\frac{1}{2}(e^{-1} - e^{-3})$

B) $\frac{1}{2}e^{-1/2}$

C) $\frac{1}{2}e^{-3/2}$

D) $e^{-1/2} - e^{-3/2}$

E) none of these

91) A random variable X is exponentially distributed with a mean of 10. Determine a so that 91) _____
 $\Pr(0 \leq x \leq a) = 0.75$.

A) $a = \ln \frac{3}{4}$

B) $a = \frac{1}{10}$

C) $a = \ln 0.75$

D) $a = \frac{1}{10} \ln 4$

E) none of these

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

92) A survey shows that the time spent in a checkout line in a certain supermarket has an 92) _____
 exponential density function with mean 5 minutes. What is the probability of spending 10 minutes or more in a checkout line? Enter just a real number rounded off to two decimal places.

- 93) It is estimated that the time between arrivals of visitors to a public library is an exponential random variable with expected value of 13 minutes. Find the probability that 30 minutes elapses without any arrivals. Enter your answer as just $e^{a/b}$, where $\frac{a}{b}$ is a reduced fraction. 93) _____
- 94) An appliance comes with an unconditional money back guarantee for its first 6 months. It has been found that the time before the appliance experiences some sort of malfunction is an exponential random variable with mean 2 years. What percentage of appliances will malfunction during the warranty period? Enter your answer as just $a \pm e^b$, where a is an integer and b is a real number to two decimal places. (no units). 94) _____
- 95) When a road crew inspects a road that hasn't been worked on for several years, then the distance between necessary repairs is an exponential random variable with a mean of 0.25 miles. What is the probability that the crew will find a mile long stretch of road that does not need repairs? Enter your answer as just e^b . 95) _____
- 96) Let X be the time to failure of an electronic component, and suppose X is an exponential random variable with $E(X) = 4$ years. Find the median lifetime, i.e., find M such that $\Pr(X \leq M) = \frac{1}{2}$. Enter just a real number rounded to two decimal places (no units). 96) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

- 97) The number of new mini-vans sold by a particular salesperson during the month of March is exponentially distributed with a mean of 8. What is the probability that the salesperson will sell between 4 and 8 mini-vans in March? 97) _____
- A) 0.239 B) 0.184 C) 0.233 D) 0.172

Determine the area under the standard normal curve that lies between:

- 98) $z = 1$ and $z = 2$ 98) _____
- A) 0.1359 B) 0.0008 C) 0.8641 D) 0.0006
- 99) $z = 0.9$ and $z = 1.4$ 99) _____
- A) 0.1841 B) 0.9192 C) 0.1033 D) 0.8159
- 100) $z = -0.7$ and $z = 0.7$ 100) _____
- A) 0.5 B) 0.242 C) 0.516 D) 0.758
- 101) $z = -2$ and $z = -0.9$ 101) _____
- A) 0.0228 B) 0.1613 C) 0.1841 D) 0.8159

- 102) A table saw cuts construction studding. Observation has shown that the lengths of the studs are normally distributed with a mean of 10 feet and a standard deviation of 6 inches. Which of the following correctly represents the probability that a randomly chosen stud exceeds 11 feet?

102) _____

A) $\frac{1}{0.5\sqrt{2\pi}} \int_{11}^{\infty} e^{(-1/2)[(x - 10)/0.5]^2} dx$

B) $\frac{1}{\sqrt{2\pi}} \int_{9.5}^{10.5} e^{-x^2/2} dx$

C) $\frac{1}{\sqrt{\pi}} \int_{9.5}^{10.5} e^{-[(x - 10)/5]^2} dx$

D) $\frac{1}{\sqrt{2\pi}} \int_{11}^{\infty} e^{-x^2/2} dx$

E) none of these

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 103) A lumber yard cuts 2" x 4" lumber into 8 foot studs. It is observed that the actual lengths of the studs are normally distributed with mean 8 feet and standard deviation 1 foot. What proportion of the studs are longer than 8.25 feet? Enter just a real number rounded off to two decimal places.

103) _____

- 104) A farmer has observed that the time to maturation of a certain crop is approximately normally distributed with a mean of 60 days and a standard deviation of 2 days. Find the percentage of plants that will mature in less than 55 days. Enter the percentage as just a real number rounded off to two decimal places followed by %.

104) _____

- 105) When mice are placed in a certain maze the amount of time it takes them to go through the maze is approximately normally distributed with a mean of 25 minutes and a standard deviation of 5 minutes. What is the probability that a mouse will complete the maze in under 30 minutes? (Hint: find the normal density function first). Enter just a real number rounded off to two decimal places.

105) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Provide an appropriate response.

- 106) A physical fitness association is including the mile run in its secondary-school fitness test. The time for this event for boys in secondary school is known to possess a normal distribution with a mean of 470 seconds and a standard deviation of 60 seconds. Find the probability that a randomly selected boy in secondary school can run the mile in less than 332 seconds.

106) _____

A) 0.9893

B) 0.4893

C) 0.0107

D) 0.5107

- 107) A physical fitness association is including the mile run in its secondary-school fitness test. The time for this event for boys in secondary school is known to possess a normal distribution with a mean of 460 seconds and a standard deviation of 50 seconds. Find the probability that a randomly selected boy in secondary school will take longer than 345 seconds to run the mile. 107) _____
 A) 0.0107 B) 0.5107 C) 0.4893 D) 0.9893
- 108) Suppose a brewery has a filling machine that fills 12 ounce bottles of beer. It is known that the amount of beer poured by this filling machine follows a normal distribution with a mean of 12.24 ounces and a standard deviation of 0.04 ounce. Find the probability that the bottle contains fewer than 12.14 ounces of beer. 108) _____
 A) 0.5062 B) 0.4938 C) 0.9938 D) 0.0062
- 109) Suppose a brewery has a filling machine that fills 12 ounce bottles of beer. It is known that the amount of beer poured by this filling machine follows a normal distribution with a mean of 14.14 ounces and a standard deviation of 0.04 ounce. Find the probability that the bottle contains more than 14.14 ounces of beer. 109) _____
 A) 0.4 B) 1 C) 0 D) 0.5
- 110) Suppose a brewery has a filling machine that fills 12 ounce bottles of beer. It is known that the amount of beer poured by this filling machine follows a normal distribution with a mean of 12.36 ounces and a standard deviation of 0.04 ounce. Find the probability that the bottle contains between 12.26 and 12.32 ounces. 110) _____
 A) 0.1525 B) 0.8475 C) 0.8351 D) 0.1649
- 111) The length of time it takes college students to find a parking spot in the library parking lot follows a normal distribution with a mean of 5.5 minutes and a standard deviation of 1 minute. Find the probability that a randomly selected college student will find a parking spot in the library parking lot in less than 5.0 minutes. 111) _____
 A) 0.3551 B) 0.2674 C) 0.3085 D) 0.1915
- 112) The length of time it takes college students to find a parking spot in the library parking lot follows a normal distribution with a mean of 6.0 minutes and a standard deviation of 1 minute. Find the probability that a randomly selected college student will take between 4.5 and 7.0 minutes to find a parking spot in the library lot. 112) _____
 A) 0.2255 B) 0.4938 C) 0.0919 D) 0.7745

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 113) A new car dealer observes that the number X of warranty claims for repairs on each new car sold is Poisson distributed, with an average of six claims per car. Compute the probability that a new car sold by the dealer will have no more than three warranty claims. 113) _____
 Enter your answer in the form ae^b .

- 114) In a certain office, the number of typewriters that break down during any given week is Poisson distributed with $\lambda = 2$. What is the probability that more than three typewriters break down during a week? Enter your answer in the form $a \pm \frac{b}{c}e^d$ where $\frac{b}{c}$ is reduced. 114) _____
- 115) Suppose the number of cars passing through a toll booth in a 10 minute interval is a Poisson random variable. If the average number of cars is 23, give an expression for the probability that n cars pass through the booth. Is $p_n = \frac{(23)^n}{n!}e^{-23}$ correct? Enter "yes" or "no". 115) _____
- 116) Suppose a small amount of blood is sampled and the number of white blood cells are counted. If the number of white blood cells is Poisson distributed with $\lambda = 6$, what is the probability that the sample has more than 4 white blood cells? What is the average number of white blood cells per sample? Is $\Pr(4 \leq X) = 0.7149$; $E(X) = 6$ correct? Enter "yes" or "no". 116) _____
- 117) Suppose that during a certain part of the day, the number X of automobiles that arrive within any one minute at a tollgate is Poisson distributed, and $\Pr(X = k) = \frac{4^k e^{-4}}{1 \cdot 2 \cdot \dots \cdot k}$. What is the average number of automobiles that arrive per minute? Enter just an integer. 117) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 118) Suppose X is a random variable whose probabilities are Poisson distributed with $p_n = \frac{(14)^n}{n!}e^{-14}$. Which of the following is true? 118) _____
- A) The probability that $x = 14$ is approximately 0.1060.
 - B) The probability that $x = 0$ is zero.
 - C) The expected value of X is e^{-14} .
 - D) The standard deviation of X is 14.

Use the Poisson Distribution to find the indicated probability.

- 119) If the random variable x has a Poisson Distribution with $\lambda = 6$, find p_1 . 119) _____
- A) 0.01487 B) 0.01859 C) 0.04043 D) 0.00744
- 120) If the random variable x has a Poisson Distribution $\lambda = 0.727$, find p_3 . 120) _____
- A) 0.13249 B) 0.03095 C) 0.00155 D) 0.03869
- 121) A naturalist leads whale watch trips every morning in March. The number of whales seen has a Poisson distribution with $\lambda = 1.6$. Find the probability that on a randomly selected trip, the number of whales seen is 3. 121) _____
- A) 0.2757 B) 0.4135 C) 0.1378 D) 0.2343

- 122) The number of lightning strikes in a year at the top of a particular mountain has a Poisson distribution with $\lambda = 4.5$. Find the probability that in a randomly selected year, the number of lightning strikes is 4. 122) _____
 A) 0.0063 B) 0.1898 C) 0.2467 D) 0.3227
- 123) The number of calls a mountain search and rescue team receives per day has a Poisson distribution with $\lambda = 0.87$. Find the probability that on a randomly selected day, they will receive fewer than two calls. 123) _____
 A) 0.1586 B) 0.3645 C) 0.7834 D) 0.2166
- 124) In one town, the number of burglaries in a week has a Poisson distribution with $\lambda = 3.5$. Find the probability that in a randomly selected week the number of burglaries is at least three. 124) _____
 A) 0.4634 B) 0.6792 C) 0.7842 D) 0.3208 E) 0.2158

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 125) A person throws a die until the side with two spots appears. The probability of throwing the die exactly n times before throwing a "2" is $\left(\frac{5}{6}\right)^n \left(\frac{1}{6}\right)$, $n \geq 0$. What is the probability that the number of throws before throwing a "2" is even? Enter just a reduced fraction. 125) _____
- 126) A basketball player attempts successive free throws until he succeeds in making a basket. Suppose the probability of success of each attempt is 0.7; thus, the probability of exactly n failures before the first success is $(0.3)^n(0.7)$, $n \geq 0$. What is the probability that the number of failures before the first successful free throw is odd? Enter just a reduced fraction. 126) _____
- 127) Suppose that a bag holds 3 blue balls and one red ball. We pull a ball from the bag at random, return it and then repeat the process. Suppose we continue pulling balls until the blue ball is drawn and then we observe the number of consecutive red balls drawn. What is the average number of red balls between occurrences of blue balls? Is $E(X) = \sum_{n=1}^{\infty} n \frac{3^n}{4^{n+1}} = \frac{1}{4} \sum_{n=1}^{\infty} n \left(\frac{3}{4}\right)^n = 3$ correct? Enter "yes" or "no". 127) _____

Answer Key

Testname: UNTITLED12

- 1) E
- 2) D
- 3) $\frac{2}{7}$
- 4) $\frac{80}{49}$
- 5) 1.28
- 6) -0.35
- 7) 2.53
- 8) 1.59
- 9) 58.50, 232.75, 15.26
- 10) 1.1
- 11) yes
- 12) $\frac{47}{6}$
- 13) 0.20
- 14) 2.00, 2.90
- 15) 74,000
- 16) 28, no
- 17) A
- 18) A
- 19) A
- 20) B
- 21) B
- 22) B
- 23) A
- 24) D
- 25) yes
- 26) $\frac{1}{3}$
- 27) no
- 28) A
- 29) B
- 30) C
- 31) A
- 32) D
- 33) 4
- 34) $\frac{3}{38}$
- 35) 3
- 36) 3
- 37) D
- 38) D

Answer Key

Testname: UNTITLED12

39) $\frac{1}{8}$

40) $\frac{1}{2}$

41) $\frac{1}{4}$

42) yes

43) $\frac{1}{2}$

44) $\frac{1}{2}$

45) $\frac{21}{100}$

46) $\frac{2}{5}$

47) $\frac{15}{256}$

48) $\frac{11}{16}$

49) 8

50) $3\sqrt{\frac{10}{7}}$

51) $\frac{35}{3}$

52) $4\sqrt{3}$

53) A

54) B

55) A

56) 0.91

57) 0.01

58) 40.96

59) C

60) A

61) A

62) $\frac{1}{54}x^3 + \frac{1}{18}x^2$

63) $1 - 16x^{-4}$

64) $\frac{1}{3}x - 4$

65) $\frac{1}{64}x^3$

66) $\frac{1}{2}x$

67) B

Answer Key

Testname: UNTITLED12

68) A

69) D

70) D

71) C

72) A

73) $\frac{1}{3}, \frac{1}{12}$

74) $\frac{7}{2}, \frac{3}{4}$

75) $\frac{3}{4}, \frac{3}{80}$

76) $\frac{3}{5}, \frac{1}{25}$

77) $\frac{5}{3}, \frac{1}{18}$

78) -1, 1

79) $\frac{19}{24}, \frac{11}{576}$

80) $\frac{25}{2}, \frac{75}{4}$

81) $\frac{45}{14}$

82) A

83) A

84) C

85) 5, 25

86) 1, 16

87) 10, 10

88) $0, \frac{1}{2}$

89) $3.9, \frac{1}{7}$

90) D

91) E

92) 0.14

93) $e^{-30/13}$

94) $1 - e^{-0.25}$

95) e^{-4}

96) 2.77

97) A

98) A

99) C

100) C

Answer Key

Testname: UNTITLED12

101) B

102) A

103) 0.4

104) 0.62%

105) 0.84

106) C

107) D

108) D

109) D

110) A

111) C

112) D

113) $61e^{-6}$

114) $1 - \frac{19}{3}e^{-2}$

115) yes

116) yes

117) 4

118) A

119) A

120) B

121) C

122) B

123) C

124) B

125) $\frac{6}{11}$

126) $\frac{21}{91}$

127) yes