1. Suppose that 30% of all small businesses are undercapitalized. Forty percent of all undercapitalized small businesses fail and 20% of all small businesses that are not undercapitalized fail. A small business is chosen at random and is found to have failed.

    The probability that it was undercapitalized is

    a. $\frac{6}{37}$ b. $\frac{3}{10}$ c. $\frac{6}{13}$ d.

    $\frac{7}{10}$

    e. none of the above

2. An urn contains two red (R) balls and six blue (B) balls. Balls are drawn randomly, in succession, and without replacement until a blue ball is drawn. If the tree diagram below represents the experiment, find x and y.

    a. $x = \frac{2}{8}$, $y = \frac{1}{7}$ b. $x = \frac{1}{3}$, $y = \frac{1}{5}$ c. $x = \frac{6}{8}$, $y = \frac{1}{7}$

    d. $x = \frac{2}{8}$, $y = \frac{6}{7}$ e. $x = \frac{2}{8}$, $y = 1$

3. Balls of different colors are placed in two urns as follows:

	Red	Green	Blue
Urn I	3	4	3
Urn II	5	3	4

What is the probability that a ball chosen from Urn I is green?

a. .3   b. .4   c. .5   d. .7   e. .25

4.   Balls of different colors are placed in two urns as follows:

	Red	Green	Blue
Urn I	4	4	2
Urn II	6	2	4

One of the urns is chosen at random and a ball is selected from that urn. What is the probability that Urn 1 was chosen given that the selected ball is red?

a. $\frac{1}{5}$ b. $\frac{4}{7}$ c. $\frac{4}{9}$ d. $\frac{3}{10}$ e. $\frac{1}{20}$

5.   The manager of a small retail store counted the number of sales each hour during a 60-hour week. The frequency distribution is given below.

number of sales during hour	number of occurrences
6	25
7	20

<div align="center">

8
9
10

10
0
5

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The relative frequency of 7 sales during an hour is

a. $\frac{7}{60}$ b. $\frac{7}{40}$ c. $\frac{1}{4}$ d. $\frac{1}{3}$

e. none of the above

6. Calculate the mean in Problem 5.

    a. 7   b. 7.5   c. 9   d. 6.5   e. none of the above

7. Which of the following can be a probability distribution for the random variable X ?

a.
k	Pr (X = k)
-2	1/3
0	5/12
1	1/4

b.
k	Pr (X = k)
1	1/3
2	-1/6
3	5/6

c.

k	Pr (X = k)
-3	1/12
1	5/12
4	1/3

d.

k	Pr (X = k)
0	1/6
1	5/12
2	2/3

e. none of the above

8.   An urn contains four white balls and three red balls. The balls are drawn from the urn, one at a time without replacement, until two white balls have been drawn. Let X be the number of the draw on which the second white ball is drawn. The values which X may be are

a. 1, 2, 3, 4, 5   b. 2, 3, 4, 5, 6, 7   c. 2, 3, 4, 5

d. 1, 2, 3, 4, 5, 6 e. none of the above

9.   Let X denote the number of boys in a family with four children.

Pr (X ≥ 3) is

a. $\frac{5}{16}$ b. $\frac{2}{3}$ c. $\frac{11}{16}$ d. $\frac{1}{4}$

e. none of the above

10. There are four exams in your English class. Your scores on the first three tests are 76, 88 and 72. In order for your average test grade to be 80, your grade on the fourth exam must be

   a. 77   b. 85   c. 82   d. 84

   e. none of the above

11. Two people play a game. A single die is thrown. If the outcome is a 2 or a 3, then A pays B $6. How much should B pay A when a 1, 4, 5 or 6 is thrown so that A and B break even, on average, over many repetitions of the game?

   a. $2   b. $4   c. $6   d. $8

   e. none of the above

12. Determine the expected value of the random variable X whose probability distribution is given below.

k	Pr (X = k)
0	.2
1	.4
2	.3
3	.1

a. 1   b. 6   c. 1.3   d. .9   e. 1.2

13. Determine the variance of the random variable X whose probability distribution is given below.

k	Pr(X = k)
1	$\frac{1}{6}$
2	$\frac{1}{6}$
3	0
4	$\frac{1}{6}$
5	$\frac{1}{6}$
6	$\frac{1}{3}$

a. $\frac{16}{6}$ b. –1 c. $\frac{22}{6}$ d. 4   e. none of the above

14. Suppose that a probability distribution has mean 20 and standard deviation 3. The Chebychev inequality states that the probability that an outcome lies between 16 and 24 is

    a. at least $\frac{7}{16}$ b. at most $\frac{1}{4}$

    c. at least $\frac{1}{4}$ d. less than $\frac{7}{16}$

    e. none of the above

15. Which of the following statements is true?

    a. There are many different normal curves with the same mean.

    b. Some normal curves are not symmetric about $x = \mu$.

    c. A normal curve is flatter when its standard deviation is small.

    d. A normal curve is completely described by its standard deviation.

    e. None of the above statements are true.

16. If Z is the standard normal random variable, then Pr ($-1.5 \leq Z \leq 0$) is

a. .0668   b. .4332   c. .5000

d. .9332   e. none of the above

17. Suppose X is a normal random variable with mean 12 and standard
deviation $\frac{5}{4}$.

An x-value of 14 corresponds to a standard value of

a. 5.5   b. 2.5   c. 1.6   d. .8

e. none of the above

18. The IQ of adults in a certain large population is normally distributed with
mean 100 and standard deviation 10. If a person is chosen at
random from this group, the probability that the person's IQ is at most
85 or at least 110 is

a. .0919   b. .2255   c. .7745

d. .9081   e. none of the above

19. A true-false test has 4 questions. What is the probability of getting at least 3 questions correct by guessing?

a. $\dfrac{5}{16}$ b. $\dfrac{1}{4}$ c. $\dfrac{1}{16}$ d. $\dfrac{3}{4}$ e. none of the above

20. A coin is flipped 10 times and the number of heads is observed. What is the probability that heads appears 9 times, given that it appears at least 9 times?

a. $\dfrac{11}{2^{10}}$ b. $\dfrac{9}{10}$ c. $\dfrac{10}{11}$ d. $\dfrac{10}{2^{10}}$ e. none of the above