

- 1) A bag contains 6 red marbles, 3 blue marbles, and 7 green marbles. If a marble is randomly selected from the bag, what is the probability that it is blue?
 A) $\frac{3}{16}$ B) $\frac{6}{16} = \frac{3}{8}$ C) $\frac{7}{16}$ D) 0 E) None of these.
- 2) Suppose that events E and F are independent, $P(E) = 0.1$ and $P(F) = 0.7$. What is the $P(E \text{ and } F)$?
 A) 0 B) 0.07 C) 0.1 D) 0.7 E) 0.8
- 3) Event A has probability 0.3. Event B has probability 0.7. If A and B are mutually exclusive, then the probability that either A or B will occur is:
 A) 0 B) 0.21 C) 0.3 D) 0.7 E) 1
- 4) Experiment: An urn contains 12 fuchsia marbles and 5 magenta marbles. Two marbles are drawn without replacement. What is the probability that both marbles are magenta?
 A) 0.2206 B) 0.4983 C) 0.4853 D) 0.0865 E) 0.074
- 5) Experiment: An urn contains 4 blue marbles and 8 orange marbles. Two marbles are drawn without replacement. What is the probability that a blue and orange marble are drawn?
 A) 0.4444 B) 0.2424 C) 0.1212 D) 0.4848 E) 0.2222

For problems 6 through 10:

The produce manager at a farmer's market was interested in determining how many oranges a person buys when they buy oranges. He asked the cashiers over a weekend to count how many oranges a person bought when they bought oranges and record this number for analysis at a later time. The data is given below in the table. The random variable X represents the number of oranges purchased and $P(x)$ represents the probability that a customer will buy x oranges.

x	1	2	3	4	5	6	7	8	9	10
$P(x)$	0.05	0.19	0.20	0.25	0.12	0.10	0	0.08	0	0.01

- 6) The table above is a probability model because:
 A) the sum of the probabilities in a probability distribution equals 1.
 B) the variable x is discrete.
- 7) Compute $P(5 \leq x \leq 8)$.
 A) 0.1 B) 0.3 C) 0.18 D) 0.22 E) 0.2
- 8) Compute the probability that a customer purchased three or more oranges.
 A) 0.69 B) 0.25 C) 0.24 D) 0.2 E) 0.76
- 9) Determine the mean number of oranges purchased by a customer.
 A) 3.57 B) 1.34 C) 1.89 D) 3.79 E) 3.97
- 10) Determine the standard deviation for the probability distribution.
 A) 3.57 B) 1.34 C) 1.89 D) 3.79 E) 3.97
- 11) 80% of people who purchase pet insurance are women. If 9 pet insurance owners are randomly selected, find the probability that at least 6 are women.
 A) .0856 B) 0.2618 C) 0.1762 D) 0.7382 E) 0.9144
- 12) In a recent survey, 60% of the community favored building a health center in their neighborhood. If 14 citizens are chosen, find the probability that exactly 5 of them favor the building of the health center.
 A) 0.207 B) 0.357 C) 0.6 D) 0.041 E) 0.456

- 13) 60% of people who purchase sports cars are men. If 12 sports car owners are randomly selected, find the probability that at most 2 are men.
 A) .0025 B) 0.0028 C) 0.0153 D) 0.9847 E) 0.9972
- 14) According to government data, the probability that an adult was never in a museum is 15%. In a random survey of 10 adults, what is the probability that at least eight were in a museum?
 A) 0.82 B) 0.2 C) 0.002 D) 0.8 E) 0.18
- 15) According to insurance records, a car with a certain protection system will be recovered 85% of the time. If 500 stolen cars are randomly selected, what is the mean number of cars recovered after being stolen?
 A) 2075 B) 589 C) 425 D) 7.98 E) 63.75
- 16) According to insurance records, a car with a certain protection system will be recovered 85% of the time. If 500 stolen cars are randomly selected, what is the standard deviation for the number of cars recovered after being stolen?
 A) 2075 B) 589 C) 425 D) 7.98 E) 63.75

For problems 17 through 19 only:

The managers of a corporation were surveyed to determine the background that leads to a successful manager. Each manager was rated as being either a good, fair, or poor manager by his/her boss. The manager’s educational background was also noted. The data appear below.

	H.S. Degree	Some College	College Degree	Master’s or Ph.D.	Total
Good	6	2	23	8	39
Fair	5	14	46	22	87
Poor	7	1	9	17	34
Total	18	17	78	47	160

If a manager is selected at random:

- 17) Find the probability that the manager has a Master’s or Ph.D.
 A) 0.2438 B) 0.05 C) 0.8298 D) 0.2938 E) None of these.
- 18) Find the probability that the manager has a H.S. degree and is a poor manager?
 A) 0.3889 B) 0.2059 C) 0.0438 D) 0.325 E) None of these.
- 19) Find the probability that the manager is a good manager, given that the manager has some college background?
 A) 0.1176 B) 0.0513 C) 0.0125 D) 0.35 E) None of these.
- 20) High temperatures in a certain city for the month of August follow a uniform distribution over the interval 40°F to 90°F. What is the probability that a randomly selected August day has a temperature that exceeded 75°F?
 A) 0.5 B) 0.67 C) 0.3 D) 0.58 E) 0.7

For problems 21 through 25 only, consider the normal curve with $\mu = 42$ and $\sigma = 4$:

- 21) Approximately _____% of the area under the normal curve is between 30 and 54.
A) 50 B) 68 C) 90 D) 95 E) 99.7
- 22) Approximately _____% of the area under the normal curve is between 38 and 46.
A) 50 B) 68 C) 90 D) 95 E) 99.7
- 23) Approximately _____% of the area under the normal curve is between 34 and 50.
A) 50 B) 68 C) 90 D) 95 E) 99.7
- 24) Exactly _____% of the area under the normal curve is greater than 42.
A) 50 B) 68 C) 90 D) 95 E) 99.7
- 25) The inflection points occur on the normal curve at which value(s)?
A) 42 B) 38 & 46 C) 34 & 50 D) 30 & 54 E) 26 & 58
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- 26) Find the area under the standard normal curve to the left of $z = 1.13$.
A) 0.1292 B) 0.8907 C) 0.8485 D) 0.8708 E) 0.8686
- 27) Find the area under the standard normal curve to the right of $z = 0.97$.
A) 0.8340 B) 0.1685 C) 0.8315 D) 0.1660 E) 0.8365
- 28) Find the area under the standard normal curve between $z = -1.10$ and $z = -0.36$.
A) 0.2237 B) 0.2239 C) 0.4951 D) 1.5049 E) 0.2275
- 29) Find the area under the standard normal curve to the left of $z = 4$.
A) ≈ 0.0 B) 0.25 C) 0.5 D) 0.75 E) ≈ 1.0
- 30) The weights of certain machine components are normally distributed with a mean of 8.98 g and a standard deviation of 0.05 g. Find the 97th percentile.
A) 8.99g B) 9.00g C) 9.07g D) 9.12g E) 9.15g
- 31) The lengths of human pregnancies are normally distributed with a mean of 268 days and a standard deviation of 15 days. What is the probability that a pregnancy lasts at least 300 days?
A) 0.016 B) 0.018 C) 0.483 D) 0.983 E) 0.902
- 32) A bank's loan officer rates applicants for credit. The ratings are normally distributed with a mean of 200 and a standard deviation of 50. If an applicant is randomly selected, find the probability of a rating that is between 170 and 220.
A) 0.6826 B) 0.2257 C) 0.1554 D) 0.0703 E) 0.3811
- 33) 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 12.23 ounces and a standard deviation of 0.04 ounce. The company is interested in reducing the amount of extra beer that is poured into the 12-ounce bottles. The company is seeking to identify the highest 1.5% of the fill amounts poured by this machine. For what fill amount are they searching? Round to the nearest thousandth.
A) 12.317 oz B) 11.913 oz C) 12.143 oz D) 12.087 oz E) 12.229 oz
- 34) Smith is a weld inspector at a shipyard. He knows from keeping track of good and substandard welds that for the afternoon shift 5% of all welds done will be substandard. If Smith checks 300 of the 7500 welds completed that shift, what is the probability that he will find less than 20 substandard welds? (Hint: $N = 7500$)
A) 0.9066 B) 0.1234 C) 0.0934 D) 0.5934 E) 0.7712
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- 35) According to the *AAA Daily Fuel Gauge Report*, the state of California average price for regular unleaded gasoline on January 2nd, 2018 was \$3.11. A week later, a random sample of 12 gas stations across Orange County yielded the following prices for regular unleaded gasoline:

3.09	3.19	2.89	3.04
2.93	3.09	3.29	2.95
3.33	3.19	3.35	3.15

Use a normal probability plot to assess whether the sample data above could have come from a population that is normally distributed.

- A) The data appear to be approximately normally distributed.
B) The data does not appear to be normally distributed.
- 36) A simple random sample of size $n = 40$ is obtained from a normal population with $\mu = 50$ and $\sigma = 4$. What is the sampling distribution of \bar{x} ?
A) normally distributed with a mean of 50 and a standard deviation of 0.632
B) normally distributed with a mean of 50 and a standard deviation of 4
C) approximately normally distributed with a mean of 50 and a standard deviation of 0.632
D) approximately normally distributed with a mean of 50 and a standard deviation of 4
E) shape unknown with a mean of 50 and a standard deviation of 4
- 37) The amount of money collected by a snack bar at a large university has been recorded daily for the past five years. Records indicate that the mean daily amount collected is \$3900 and the standard deviation is \$600. The distribution is skewed to the right due to several high volume days (including football game days). Suppose that 100 days were randomly selected from the five years and the average amount collected from those days was recorded. Which of the following describes the sampling distribution of the sample mean?
A) normally distributed with a mean of \$3900 and a standard deviation of \$60
B) normally distributed with a mean of \$3900 and a standard deviation of \$600
C) approximately normally distributed with a mean of \$3900 and a standard deviation of \$60
D) skewed to the right with a mean of \$3900 and a standard deviation of \$600
E) skewed to the right with a mean of \$3900 and a standard deviation of \$60
- 38) The reasoning for your answer in Problem #37 is:
A) the law of large numbers
B) the central limit theorem
C) the 68-95-99.7 rule
D) the fact that probability is the long-run proportion of times an event occurs
E) the sampling distribution
- 39) A candy company claims that its jelly bean mix contains 21% blue jelly beans. Suppose that the candies are packaged at random in small bags containing about 400 jelly beans. Describe the sampling distribution model of \hat{p} , the proportion of blue jelly beans in a bag.
A) Approximately normal; $\mu_{\hat{p}} = 0.21$, $\sigma_{\hat{p}} = 0.000415$ B) Binomial; $\mu_{\hat{p}} = 0.21$, $\sigma_{\hat{p}} = 8.15$
C) Approximately normal; $\mu_{\hat{p}} = 0.21$, $\sigma_{\hat{p}} = 0.0204$ D) Exactly normal; $\mu_{\hat{p}} = 0.21$, $\sigma_{\hat{p}} = 0.0204$
E) Exactly normal; $\mu_{\hat{p}} = 0.21$, $\sigma_{\hat{p}} = 0.000415$
- 40) The owner of a computer repair shop has determined that their daily revenue has mean \$7200 and standard deviation \$1200. The daily revenue totals for the next 30 days will be monitored. What is the probability that the mean daily revenue for the next 30 days will exceed \$7500?
A) 0.9147 B) 0.0869 C) 0.4013 D) 0.9131 E) 0.0853

© Answers:

1) A; 2) B; 3) E; 4) E; 5) D; 6) A; 7) B; 8) E; 9) E; 10) C; 11) E; 12) D; 13) B; 14) A; 15) C; 16) D;
17) D; 18) C; 19) A; 20) C; 21) E; 22) B; 23) D; 24) A; 25) B; 26) D; 27) D; 28) A; 29) E; 30) C;
31) A; 32) E; 33) A; 34) A; 35) A; 36) A; 37) C; 38) B; 39) C; 40) E.

$$P(z > z_{0.015}) = .015$$

33) $P(z > 2.17) = .015$, since $z = \frac{X - \mu}{\sigma}$, then $2.17 = \frac{X - 12.23}{0.04}$, so $X = 12.3168$

$$P(X > 12.317) = .015$$
