1. Which of the following questions on a job application does not naturally give rise to a binomial variable?

    a) What is your gender?
    b) Have you graduated high school?
    c) Have you ever been convicted of a felony?
    d) What is your Social Security number?
    e) Are you a citizen of the United States?

2. In a random sample of 35 high school seniors, the mean number of hours slept on Friday night/Saturday morning was 7.2. The standard symbol to use for this value is

    a) μ
    b) $\bar{x}$
    c) σ
    d) s
    e) $\tilde{x}$

3. In the 2004–2005 academic year 433 U.S. citizens received a Ph.D. in a mathematical science from an American university, as did 683 non-citizens. Find the probability that a randomly selected Ph.D. recipient was a U.S. citizen.

    a) .388
    b) .366
    c) .634
    d) 2.58
    e) 1.58

4. The probability that a particular stoplight is red when you approach it is .45 and the probability that it is yellow is .15. What is the probability that it is green?

    a) .30
    b) .33
    c) .25
    d) .60
    e) .40

5. If IQ scores are normally distributed with mean 100 and standard deviation 15, then approximately 68% of all IQs fall between what two values?

    a) 85 and 115
    b) 70 and 130
    c) 100 and 115
    d) 100 and 130
    e) 85 and 130

6. Each of the 40 questions on this test has five choices for its answer. If you were to randomly guess on each question, what is the expected value of the number of correct answers?

    a) 0
    b) 5
    c) 8
    d) 10
    e) 20

7. Find the median of the following data: 11.3, 13.4, 11.6, 22.8, 17.6, 12.2, 11.6, 11.6, 14.8, 12.5

    a) 14.9
    b) 11.6
    c) 12.35
    d) 13.94
    e) 11.9

8. In the 2006 Boston Marathon, 20117 runners competed. Martin Long of Arlington, MA finished in 4552nd place. In what percentile did he place?

    a) 77
    b) 29
    c) 23
    d) 71
    e) 22

9. Find the mean of the random variable X:

x	18	19	20	21
P(x)	0.1	0.1	0.2	0.6

a) .25
b) 19.5
c) 20.3
d) 21
e) 1

10. Suppose that you must go through 8 traffic lights between home and work each day and that the lights are not synchronized, so that for each light the probability that it is green when you approach the intersection is 0.46. Find the probability that you can make it through all the lights without stopping, that is, find the probability that all are green when you approach them.

a) 0
b) .0020
c) .0575
d) .9928
e) 3.68

11. A 95% confidence interval for a percentage p is (.913, .963). What were the sample proportion and margin of error?

a) $\bar{x} = .938$, E = .05
b) $\hat{p} = .95$, E = .05
c) $\hat{p} = .938$, E = .025
d) $\hat{p} = .938$, E = .95
e) $\bar{x} = .95$, E = .025

12. Your club has 10 members and decides to elect a president, vice president, and secretary. In how many different ways could members be picked to fill these positions, assuming no one is allowed to hold more than one office?

a) 5,040
b) 3,628,800
c) 120
d) 720
e) 10

13. For the list of sample data 16, 17, 21, 22, 24, the range and standard deviation are:

    a) range: 16–24, standard deviation: 3.03
    b) range: 8,   standard deviation: 3.03
    c) range: 16–24, standard deviation: 3.39
    d) range: 8,   standard deviation: 3.39
    e) range: 16–24, standard deviation: 9.20

14. From this scatterplot, it appears that:
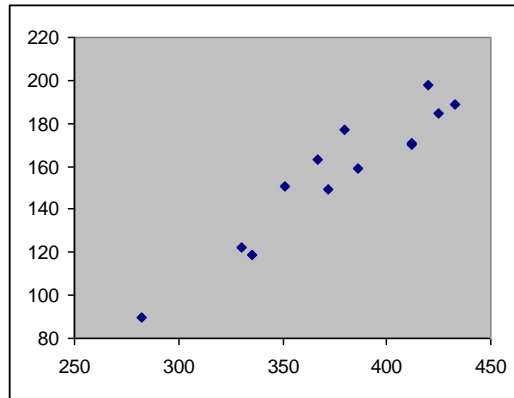
    a) There is no correlation between X and Y
    b) X and Y are negatively correlated
    c) X and Y are positively correlated
    d) X and Y are neutrally correlated
    e) X and Y are exponentially correlated

15. Billy Bob's friend convinces him to play a game in which his probability of winning $10 is .083; if he doesn't win, he loses $1. Find Billy Bob's expected winnings from playing this game.

    a) 83¢
    b) $8.13
    c) -83¢
    d) -.087¢
    e) -8.7¢

16. There are ten balls in an urn, of which four are purple, three are orange, and three are red. If we draw two balls without replacement, what is the probability that both are orange?

    a) $\dfrac{1}{15}$

    b) $\dfrac{9}{100}$

    c) $\dfrac{6}{10}$

    d) $\dfrac{47}{90}$

    e) $\dfrac{3}{10}$

17. For the standard normal distribution, find $P(0.32 < Z < 2.10)$.

    a) .3924
    b) .3566
    c) 1.6076
    d) .6434
    e) .6076

18. We are shown the data 71, 73, 74, 77, 80 but not told from where it came. Then we can conclude that the variable X from which this data comes is:
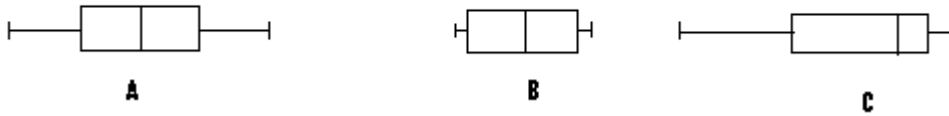
    a) Discrete
    b) Continuous
    c) Both discrete and continuous
    d) Neither discrete nor continuous
    e) Either discrete or continuous but not both

19. Given the following data, what is the value of the correlation coefficient?

x	14	17	19	20	22
y	9	7	5	6	2

    a) -.7957
    b) 20.44
    c) .8788
    d) .9375
    e) -.9375

20. Which of the following boxplots could represent a normal distribution?

a) A only
b) B only
c) C only
d) A and B
e) A, B, and C

21. Which of the following pairs of events are not mutually exclusive?

a) X = Bob is human, Y = Bob is a fungus
b) X = The sum of the dots on two dice is 8, Y= The sum of the dots on two dice is odd
c) X = Bob is a father, Y= Bob is a son
d) X = Acme's stock price is higher, Y = Acme's stock price is lower
e) X = Bob scored 100 on today's test, Y = Bob scored 72 on today's test

22. Suppose three hundred adults in Tennessee are asked the questions "Do you like the University of Tennessee?" and "Do you own orange clothing?" with the following results:

	Orange clothing	No orange clothing
Like UT	147	102
Don't like UT	12	39

Find the probability that a randomly selected survey participant likes the University of Tennessee given that they own orange clothing.

a) $\dfrac{261}{300}$

b) $\dfrac{147}{300}$

c) $\dfrac{147}{249}$

d) $\dfrac{147}{159}$

e) $\dfrac{159}{300}$

23. Suppose weights of soup cans are normally distributed with mean $\mu = 10.13$ oz and standard deviation $\sigma = 0.11$ oz. What is the probability that a randomly selected soup can has weight less than 10 oz?

   a) .8810
   b) .1151
   c) -1.18
   d) .1186
   e) 1.18

24. Suppose 60% of students at a large high school are female. If ten students are randomly selected for a committee, what is the probability that exactly four of them are female?

   a) .111
   b) .400
   c) .130
   d) .166
   e) .001

25. Suppose we survey 948 potential voters and find that 36.1% are in favor of Ballot Initiative 13. Using 99% level of confidence, what would be the margin of error for this survey?

   a) $\pm 3.0\%$
   b) $\pm 4.0\%$
   c) $\pm 13.9\%$
   d) $\pm 2.6\%$
   e) $\pm 1.6\%$

26. The random variable X is skewed left. We can conclude that:

   a) There must be outliers far to the left of the mean.
   b) There must be outliers far to the right of the mean.
   c) The mean is larger than the median.
   d) The mean and median are equal.
   e) The mean is smaller than the median.

27. If P(A)=.7, P(B)=.5, and A and B are independent events, what is P(A or B)?

    a) .35
    b) 1.2
    c) .85
    d) .2
    e) Not enough information

28. The random variable X is normally distributed with mean 14.2 and standard deviation 4.0. If samples of size n=16 are taken, what is $\sigma_{\bar{x}}$?

    a) 0.25
    b) 14.2
    c) 4.0
    d) 10.2
    e) 1.0

29. In a hypothesis test with $H_0 : p = .5$ and $H_1 : p < .5$, the test is called

    a) Half-tailed
    b) Left-tailed
    c) Right-tailed
    d) Two-tailed
    e) No-tailed

30. A random sample of 10 rods yields a mean length of 31.72 cm with standard deviation 0.26 cm. A normal probability plot shows that the lengths are at least approximately normally distributed. A 95% confidence interval for the mean length of all rods would be:

    a) 31.53 cm $< \mu < 31.91$ cm
    b) 31.53 cm $< \bar{x} < 31.91$ cm
    c) 31.57 cm $< \mu < 31.87$ cm
    d) 31.57 cm $< \bar{x} < 31.87$ cm
    e) 31.56 cm $< \mu < 31.88$ cm

31. In a hypothesis test with H_1: $\mu \neq 31.85$, our conclusion is "do not reject H_0." An appropriate interpretation would be:

   a) There is enough evidence to conclude that the mean is 31.85.
   b) There is not enough evidence to conclude that the mean is 31.85.
   c) There is enough evidence to conclude that the mean is not 31.85.
   d) There is not enough evidence to conclude that the mean is not 31.85.
   e) We know the mean is not 31.85, but we cannot state whether the mean is larger than 31.85 or smaller than 31.85.

32. It is known that when machine 37A fills bottles of shampoo, the standard deviation is 0.127 fl oz. We have adjusted the machine to fill bottles of a different volume and now wish to estimate the mean volume to within ± 0.01 fl oz., with 95% confidence. What is the required sample size?

   a) 25
   b) 619.6
   c) 620
   d) 24.9
   e) 436

33. Given a hypothesis test for which $H_1 : p \neq .32$ with test statistic $z = 2.05$, the p-value is

   a) 1.9596
   b) -.0202
   c) .0404
   d) .9798
   e) .0202

34. Weights of budgerigar eggs are normally distributed with mean 2.5 grams and standard deviation 0.46 grams. Find the first quartile of weights (in grams) of budgerigar eggs.

   a) .25
   b) 2.19
   c) -.67
   d) 2.04
   e) 2.81

35. Which of the following statements about confidence intervals and sample size is not true?

   a) All else being the same, the larger the population, the larger the necessary sample size.
   b) All else being the same, the larger the desired confidence level, the larger the necessary sample size.
   c) All else being the same, the smaller the desired margin of error, the larger the necessary sample size.
   d) All else being the same, the larger the known standard deviation, the larger the necessary sample size.
   e) All else being the same, the larger the sample size, the smaller the margin of error.

36. A sample of 25 homes in a new subdivision shows that the correlation coefficient relating size of a home and price of a home is r = 0.837. Then the proportion of variability in price that can be attributed to size is

   a) 0.915
   b) 0.837
   c) 0.163
   d) 0.701
   e) Insufficient data

37. The random variable X represents the time it takes to complete a certain task. It is known that $\mu = 27.3$ min, $\sigma = 42.8$ min. We can conclude that:

   a) The distribution of X is skewed left.
   b) The distribution of X is skewed right.
   c) The distribution of X is the standard normal.
   d) The distribution of X is normal but not the standard normal.
   e) The distribution of X is symmetric but not normal.

38. A sample of 777 sewer rats yielded 366 that are carriers of disease X. We wish to test the hypothesis that 50% of all sewer rats are carriers of disease X. What is the value of the test statistic?

   a) $z = 0$
   b) $t = 1.62$
   c) $\hat{p} = .471$
   d) $z = -1.61$
   e) $p = .50$

39. In the 2005–2006 season, LeBron James had 10.3 free throw attempts per game. Assuming a Poisson process, approximate the probability that in a randomly selected game he gets exactly 20 free throw attempts.

    a) .6985
    b) .0025
    c) .5150
    d) .3015
    e) .0047

40. Lye R. Smith likes to play golf. The lengths (in yards) of his drives vary as follows:

length	x<235	235<x<240	240<x<245	x>245
proportion	0.2	0.3	0.3	0.2

But Lye says he hits it 250 yards with the following probability:

actual length of drive	x<235	235<x<240	240<x<245	x>245
P(calling it 250 yards)	0	0.2	0.5	1

Given a randomly selected drive, what is the probability that Lye says he hit it 250 yards?

    a) .1025
    b) 1
    c) .2
    d) .75
    e) .41

Alternate question #1

You work in a soup cannery. Weights of soup cans are normally distributed with mean $\mu =$ 10.13 oz and standard deviation $\sigma = 0.11$ oz. Your manager wants you to fill in the blank in the statement that he must make to his boss tomorrow: "The heaviest 10% of our soup cans weigh _____ or more." What should go in the blank?

 a) 10.19 oz
 b) 10.24 oz
 c) 9.99 oz
 d) 10.27 oz
 e) 10.15 oz

Alternate Question #2

A sample of 25 homes in a new subdivision shows that the correlation coefficient relating size of a home and price of a home is r = .837. Then the proportion of variability in price that can be attributed to its size is

 a) .915
 b) .701
 c) .163
 d) .837
 e) Insufficient data