

1. Toshiba TV Production Company wants to set the warranty on its new HDTV. The lifetime of its new HDTV set was tested to be normally distributed with a mean of 96 months and a standard deviation of 8 months. If Toshiba is willing to replace only 0.5% of its HDTVs, for what number of months should its warranty be set?
 - A. =NORM.INV(0.05, 96, 8)
 - B. =NORM.INV(1-.995, 96, 8)
 - C. =NORM.DIST(4.8, 96, 8, 1)
 - D. =NORM.DIST(48, 96, 8, 1)

2. Which of the following statements is true?
 - A. The standard deviation of any normal random variable is equal to one.
 - B. The probability that a standard normal random variable will have a value of ten is very close to one.
 - C. Any normal random variable with a standard deviation equal to one is a standard normal random variable.
 - D. For any normal random variable, the probability that the random variable will equal one is always zero.

3. Which of the following is true about the “sampling distribution” of a statistic?
 - A. The sampling distribution of any statistic will be approximately normal.
 - B. The sampling distribution of a statistic is the population distribution from which the sample is drawn.
 - C. The sampling distribution of a statistic is generated by calculating the statistic for repeated samples from the original population.
 - D. Both a and b are true.

4. What must be true of the outcome of each trial in a binomial random variable?
 - A. It must depend only on π and n .
 - B. The outcome can be any real number as long as the numbers are continuous.
 - C. The probability of success is constant for each trial.
 - D. The outcome is limited to success, failure or otherwise.

5. All alcohol served at all bars in the *Bellagio* Resort, Casino and Hotel in Las Vegas is dispensed electronically from the "Pump Room" in the basement of the complex. The system is calibrated to dispense 1.5 ounces of alcohol per drink on average, however, the actual amount dispensed is a random variable with a standard deviation of 0.1 ounces. At regular intervals, the Pump Room system initiates a self-diagnostic program that randomly dispenses 36 servings of alcohol. The servings are measured manually and a 90% confidence interval of the mean serving is calculated for verification purposes. What is the random variable used in this diagnostic process and how is it distributed?
- A. $X \sim N(1.5, 0.1)$
 B. $X \sim ?(1.5, 0.0167)$
 C. $\bar{X} \sim ?(1.5, 0.1)$
 D. $\bar{X} \sim N(1.5, 0.0167)$

Most Internet Service Providers (ISPs) attempt to provide a large enough service so that customers seldom encounter a busy signal. Suppose that the customers of one ISP encounter busy signals 11% of the time. Samples of 49 randomly selected customers of this ISP were surveyed. Refer to this information to answer the next **FOUR** questions. **Note: the questions continue onto the next page.**

6. What is the probability that more than 4 of them encountered a busy signal?
- A. =1-NORM.DIST(0.082,0.11,0.89,1)
 B. =1-NORM.DIST(0.0812,0.33,0.11,1)
 C. =1-NORM.DIST(0.082,0.11,0.041,1)
 D. =1-NORM.DIST(4,0.11,0.89,1)
7. Estimate the probability that the proportion of the sample that encounters a busy signal is 0.16.
- A. 0.0% b. 25.0% c. 50.0% d. 75.0%
8. Use the Empirical rule to estimate a 95% confidence interval for the population proportion of customers that encounter a busy signal if 10% of customers received a busy signal in a sample of 64.
- A. [0.025, 0.175]
 B. [0.022, 0.178]
 C. [0.061, 0.139]
 D. [0.071, 0.149]

9. Suppose a 90% confidence interval was constructed for the proportion of busy signals encountered by customers. The interval constructed was [0.05, 0.13]. What is the margin of error for this confidence interval?
- A. This calculation requires a standard error.
 B. 0.01
 C. 0.08
 D. 0.04
10. One characteristic of any Student's t distribution is
- A. it is right skewed.
 B. as n increases, the t -distribution approaches a uniform distribution.
 C. it is described by its degrees of freedom.
 D. it has a mean of 0 and a standard deviation of 1.
11. Which of the following statements is true?
- A. Chance will cause a statistic to vary from sample to sample.
 B. All parameters have sampling distributions.
 C. A parameter is a function of sample outcomes.
 D. Usually both the mean and variance are known for most populations.
12. What is the random variable in the sampling distribution of the sample proportion?
- A. \bar{X} B. p C. $\sqrt{\frac{\pi^*(1-\pi)}{n}}$ D. π

A manufacturer of outdoor brass mailboxes claims that the number of days until its mailboxes show the first sign of corrosion is normally distributed with a mean of 1460 days and a standard deviation of 250 days. Refer to this information to answer the next ***THREE*** questions. **Note: the questions continue onto the next page.**

13. What is the probability that a randomly selected mailbox will be corrosion-free more than 5 years? (Remember there are 365 days in a year.)
- A. =1-NORM.DIST(1825, 1460, 250, 1)
 B. =1-NORM.INV(1460, 1825, 250)
 C. =NORM.INV(1825, 1460, 250)
 D. =NORM.DIST(1460, 1825, 250, 1)

14. The manufacturer received complaints about "premature corrosion" which accounted for 8% of all customers. What is the level of 'premature' corrosion in the customers' point of view?
- A. =1-NORM.DIST(0.92, 1460, 250, 1)
 - B. =NORM.DIST(.08, 1460, 250, 1)
 - C. =NORM.INV(0.92, 1460, 250)
 - D. =NORM.INV(0.08, 1460, 250)
15. What will be the Z score of a mailbox that lasts 3 years before the first sign of corrosion?
- A. -1 B. +1 C. -1.46 D. +1.46
16. The probability that a Z score will be between 0 and 2 is _____ than the probability that a t score will be between 0 and 2.
- A. always smaller
 - B. always greater
 - C. sometimes greater, sometimes smaller
 - D. always equal to
17. A manufacturer of headache medicine claims it is 90 percent effective within a few minutes. A random sample of 50 headache sufferers was selected out a total of 3500. What is the standard error of the sampling distribution of the sample proportion to 3 decimals?
- A. 0.002 B. 0.013 C. 0.017 D. 0.042

In a *Bon Appetit* poll, 33% of people polled said that chocolate was their favorite flavor of ice cream. A random sample of 25 people was asked to name their favorite flavor of ice cream. Refer to this information for the next **SIX** questions. **Note: the questions continue onto the next page.**

18. What is the probability that no less than 5 would say chocolate was their favorite flavor of ice cream?
- A. =1-BINOM.DIST(4, 25, 0.33, 1)
 - B. =1-BINOM.DIST(5, 25, 0.33, 1)
 - C. =BINOM.DIST(4, 25, 0.33, 1)
 - D. =BINOM.DIST(5, 25, 0.33, 1)

19. What is the minimum sample size necessary in order to estimate the previous question using a Normal Approximation?
- A. 8 B. 16 C. 30 D. 32
20. What is the expected number of people who favor chocolate ice cream?
- A. 0.33 B. 5.53 C. 8.25 D. 16.75
21. What is the standard deviation of the number favoring chocolate ice cream out of 25 people?
- A. 2.35 B. 2.87 C. 4.09 D. 5.53
22. The best description of the histogram that represents the above distribution is a histogram that is
- A. left-skewed with 26 columns.
B. symmetric with 25 columns.
C. a bell curve with 25 columns.
D. right-skewed with 26 columns.
23. Suppose that all 25 of the persons surveyed said that chocolate was their favorite ice cream flavor. What would you think about the *Bon Appetit* poll report of 33%?
- A. It appears quite accurate.
B. It appears too low.
C. It appears too high.
D. It appears random.
24. The mean and standard deviation completely describe a normal distribution. What information is required to completely describe a binomial distribution?
- A. probability of success only
B. probability of success and number of trials.
C. number of trials and the standard deviation
D. probability of success and variance only

25. A sample of $n=400$ is randomly selected from a binomial population with $\pi = 0.6$. Describe the appropriate approximate sampling distribution of the sample proportion.
- A. $p \sim N(240, 9.798)$
 - B. $p \sim N(0.6, 0.0245)$
 - C. $p \sim \text{Binomial}, n=400, \pi = 0.6$
 - D. A sample proportion is required to answer this question.
26. Suppose the ages of students in E370 follow a normal distribution with a mean of 23 years and a standard deviation of 3 years. If we randomly sample 16 students, which of the following statements about the sampling distribution of the sample mean age is true?
- A. The mean of the sampling distribution is equal to $23/4 = 5.75$ years.
 - B. The standard deviation of the sampling distribution is equal to 0.1875 years.
 - C. The shape of the sampling distribution is normal.
 - D. All of the above statements are correct.
27. The Central Limit Theorem implies that the sampling distribution of the sample mean \bar{X} will be approximately normal if the sample size, n , is large. Does the sample size necessary to achieve a reasonably "approximate" normal shape depend on characteristics of the sampled population distribution?
- A. No, population characteristics are irrelevant to the Central Limit Theorem.
 - B. Yes, because the population must be normally distributed.
 - C. Yes, because if the population is normally distributed sample size must be larger.
 - D. No, all that matters is that populations be finite.
28. The owner of a fish market determined that the average weight for a catfish is 2.8 pounds with a standard deviation of 0.9 pound. The owner would like to designate as a CITATION catfish those fish that are exceptionally large. If the owner selects the weight with a Z-score of 3 to be the lowest weight of a CITATION catfish, at what weight does a catfish become a CITATION catfish?
- A. 0.1 pounds
 - B. 2.7 pounds
 - C. 3.0 pounds
 - D. 5.5 pounds

29. Conceptually, what is the relationship between the Standard Normal and any other normal distribution?
- A. The Standard Normal is identical to any other normal.
 - B. They all have the same upper and lower limit, but nothing else.
 - C. The Standard Normal is taller and narrower than any other normal.
 - D. The Standard Normal is any other normal in standard deviation units.
30. Which of the following is **NOT** true of the binomial distribution?
- A. The mean of the binomial is determined by multiplying the probability of a success by the number of trials.
 - B. If the probability of failure remains the same, but n increases, the shape of the binomial distribution becomes more symmetric.
 - C. The binomial probability distribution is always either positively or negatively skewed.
 - D. The variance of the binomial distribution is found by $n\pi(1-\pi)$.
31. The mean of the distribution of sample means will be equal to the population mean
- A. always.
 - B. only when n is at least 30.
 - C. only when the population is normally distributed.
 - D. only when n is at least 30 and the population is normally distributed.
32. If the standard error for the sample mean is 5 when $n=100$, if we decrease n to 25 the standard error will be
- A. 100
 - B. 50
 - C. 10
 - D. 5
33. Historically, GMAT scores of students who apply to the Kelley School of Business are approximately normally distributed with a mean of 525 and a standard deviation of 53. The Kelley School will not consider applicants whose score is in the bottom 75%. What is the minimum GMAT score that will guarantee Kelley School consideration?
- A. =NORM.INV(1-0.25,525,53)
 - B. =NORM.INV(1-0.75,525,53)
 - C. =1- NORM.INV(0.75,525,53)
 - D. =NORM.INV(0.025,525,53)

Blue Version						
1 B	6 C	11 A	16 B	21 A	26 C	31 A
2 D	7 A	12 B	17 D	22 D	27 A	32 C
3 C	8 A	13 A	18 A	23 B	28 D	33 A
4 C	9 D	14 D	19 B	24 A	29 D	
5 D	10 C	15 C	20 C	25 B	30 C	