In almost all problems, I have given the answers to four significant digits. If your answer is slightly different from one of mine, consider that to be roundoff error and mark the closely matching one. If your answer differs from the closest one of mine by more than one percent (meaning the ratio of yours to mine is less than 0.99 or greater than 1.01), then mark "J) None of the preceding".

1. As an example in Chapter 10 indicates, one of the important factors determining a car's *fuel efficiency* is its *weight*. However, estimating miles per gallon as a linear function of weight does not work very well. Instead, the authors re-expressed fuel consumption and got a much better fit to the data. In an exercise they obtained the following equation:

Variable	Coefficient
Intercept	0.624932
WT(1000)	1.17791

Use this fitted equation to estimate the miles per gallon expected from a 3000-pound car.

A) 23.05 B) 24.05 C) 25.05 D) 26.05 E) 27.05 F) 28.05 G) 29.05 H) 30.05 I) 31.05 J) None of the preceding

2. To get a linear fit of y = planetary year with x = average distance from sun, we took the logarithm of both variables, getting an R^2 value very close to 1. What was the coefficient of the log of x in the regression equation? Hint: This is in agreement with one of Kepler's laws.

A) 1.001 B) 1.101 C) 1.201 D) 1.301 E) 1.401 F) 1.501 G) 1.601 H) 1.701 I) 1.801 J) None of the preceding

3. In Chapter 11's example, 20% of the cereal boxes contained a picture of Tiger Woods, 30% Lance Armstrong, and the rest Serena Williams. Suppose you buy five boxes of cereal. Use the ten sets of five numbers from the following line in the TABLE OF RANDOM DIGITS to simulate ten runs of buying five boxes of cereal:

18375 19310 59796 89832 59417 18533 17238 05474 33259 50595

Assign the digits 0 and 1 to Tiger; 2, 3, and 4 to Lance; and the remaining digits to Serena. Based on this simulation, estimate the probability that you end up with a complete set of their pictures.

A) 0 B) 0.1 C) 0.2 D) 0.3 E) 0.4 F) 0.5 G) 0.6 H) 0.7 I) 0.8 J) None of the preceding

4. A manufacturing company employs 14 project managers, 48 foremen, and 377 laborers. In an effort to keep informed about any possible sources of employee discontent, management wants to conduct job satisfaction interviews with a sample of employees every month. Listed below are the last names of the project managers. Use the following line from the TABLE OF RANDOM DIGITS to select three people to be interviewed:

11232 99884 05087 76839 65142 19994 91497 29350 83852 04905

01 Barrett	02 Bowman	03 Chen
04 DeLara	05 DeRoos	06 Grigorov
07 Maceli	08 Mulvaney	09 Pagliarulo
10 Rosica	11 Smithson	12 Tadros
13Williams	14 Yamamoto	

Give the name of the third person to be selected by this process.

A) DeLara B) DeRoos C) Grigorov D) Maceli E) Mulvaney F) Pagliarulo G) Rosica H) Smithson I) Tadros J) None of the preceding

5. Do cars get better gas mileage with premium instead of regular unleaded gasoline? While it might be possible to test some engines in a laboratory setting, we'd rather use real cars and real drivers in real day-to-day driving, so we get 20 volunteers. What type of experimental design was recommended in the answer to this exercise? (Note: Although several words may apply, I have given only *one* correct choice below, and I have not let J be "none of the preceding.")

A) Blocked B) Placebo C) Factorial D) Single-blind E) Double-blind F) Completely Randomized G) Retrospective H) Stratified I) Systematic J) Latin Square

6. The Masterfoods company says that before the introduction of purple, yellow candies made up 20% of their plain M&M's, red another 20%, and orange, blue, and green each made up 10%. The rest were brown. If you pick three M&M's in a row from this distribution of colors, what is the probability that at least one is brown?

A) 0.1570 B) 0.2570 C) 0.3570 D) 0.4570 E) 0.5570 F) 0.6570 G) 0.7570 H) 0.8570 I) 0.9570 J) None of the preceding

7. The American Red Cross says that about 45% of the U.S. population has Type O blood, 40% Type A, 11% Type B, and the rest Type AB. Among five potential unrelated donors, what is the probability that no one is Type B?

A) 0.5084 B) 0.5584 C) 0.6084 D) 0.6584 E) 0.7084 F) 0.7584 G) 0.8084 H) 0.8584 I) 0.9584 J) None of the preceding

8. In its monthly report, the local animal shelter states that it currently has 20 dogs and 28 cats available for adoption. Eight of the dogs and 16 of the cats are male. If an animal is selected at random, find the conditional probability that the animal is a cat given that it is a female.

A) 0.3000 B) 0.3250 C) 0.3500 D) 0.3750 E) 0.4000 F) 0.4250 G) 0.4500 H) 0.4750 I) 0.5000 J) None of the preceding

9. Sixty-six percent of all American workers have a workplace retirement plan, 64% have health insurance, and 55% have both benefits. We select a worker at random. What's the probability the worker has health insurance if the worker has a retirement plan?

A) 0.6333 B) 0.6667 C) 0.7000 D) 0.7333 E) 0.7667 F) 0.8000 G) 0.8333 H) 0.8667 I) 0.9000 J) None of the preceding

10. Police often set up sobriety checkpoints—road blocks where drivers are asked a few brief questions to allow the officer to judge whether or not the person may have been drinking. If the officer does not suspect a problem, drivers are released to go on their way. Otherwise, drivers are detained for a Breathalyzer test that will determine whether or not they are arrested. The police say that based on the brief initial stop, trained officers can make the right decision 75% of the time. Suppose the police operate a sobriety checkpoint after 11 p.m. on a Saturday night, a time when national traffic safety experts suspect that about 20% of drivers have been drinking. What's the probability that a driver who is detained has actually been drinking?

A) 0.3386 B) 0.3686 C) 0.3986 D) 0.4286 E) 0.4586 F) 0.4886 G) 0.5186 H) 0.5486 I) 0.5786 J) None of the preceding

11. Your company bids for two contracts. You believe the probability you get contract #1 is 0.7. If you get contract #1, the probability you also get contract #2 will be 0.15, and if you do not get #1, the probability you get #2 will be 0.35. Let X be the number of contracts you get. Find the standard deviation of X.

A) 0.4203 B) 0.4503 C) 0.4803 D) 0.5103 E) 0.5403 F) 0.5703 G) 0.6003 H) 0.6303 I) 0.6603 J) None of the preceding

12. Bicycles arrive at a bike shop in boxes. Before they can be sold, they must be unpacked, assembled, and tuned (lubricated, adjusted, etc.). Based on past experience, the shop manager makes the following assumptions about how long this may take:
- The times for each setup phase are independent.
- The times for each phase follow a Normal model.
- The means and standard deviations of the times (in minutes) are as shown:

Phase	Mean	St. Dev.
Unpacking	3.5	0.7
Assembly	16.8	2.4
Tuning	10.3	2.7

A customer decides to buy a bike like one of the display models, but wants a different color. The shop has one, still in the box. The manager says they can have it ready in half an hour. What is the probability the bike will be set up and ready to go as promised?

A) 0.3952 B) 0.4152 C) 0.4352 D) 0.4552 E) 0.4752 F) 0.4952 G) 0.5152 H) 0.5352 I) 0.5552 J) None of the preceding

13. Based on concerns raised by her preliminary research, a biologist problem decides to collect and examine 250 frogs. Assuming the frequency of the trait is 1 in 6, determine the standard deviation of the number of frogs with the trait she should expect to find in her sample.

A) 4.693 B) 4.893 C) 5.093 D) 5.293 E) 5.493 F) 5.693 G) 5.893 H) 6.093 I) 6.293 J) None of the preceding

14. I am the only bank teller on duty at my local bank. I need to run out for 15 minutes, but I don't want to miss many customers. Suppose the arrival of customers can be modeled by a Poisson distribution with mean 3 customers per hour. What's the probability that 2 or more people arrive in the next 15 minutes?

A) 0.1734 B) 0.2034 C) 0.2334 D) 0.2634 E) 0.2934 F) 0.3234 G) 0.3534 H) 0.3834 I) 0.4134 J) None of the preceding

15. Vitamin D is essential for strong, healthy bones. Our bodies produce vitamin D naturally when sunlight falls upon the skin, or it can be taken as a dietary supplement. Although the bone disease rickets was largely eliminated in England during the 1950's, some people there are concerned that this generation of children is at increased risk because they are more likely to watch TV or play computer games than spend time out doors. Recent research indicated that about 20% of British children are deficient in vitamin D. Suppose doctors test a group of elementary school children. What's the probability that the first vitamin D deficient child is the 5th one tested?

A) 0.06092 B) 0.06392 C) 0.06692 D) 0.06992 E) 0.07292 F) 0.07592 G) 0.07892 H) 0.08192 I) 0.08492 J) None of the preceding

16. Vitamin D is essential for strong, healthy bones. Our bodies produce vitamin D naturally when sunlight falls upon the skin, or it can be taken as a dietary supplement. Although the bone disease rickets was largely eliminated in England during the 1950's, some people there are concerned that this generation of children is at increased risk because they are more likely to watch TV or play computer games than spend time out doors. Recent research indicated that about 20% of British children are deficient in vitamin D. Suppose doctors test a group of elementary school children. If they test 222 children, what's the probability that no more than 40 of them have the vitamin deficiency? Use an exact computation, not a normal approximation.

A) 0.1696 B) 0.1996 C) 0.2296 D) 0.2596 E) 0.2896 F) 0.3196 G) 0.3496 H) 0.3796 I) 0.4096 J) None of the preceding

17. Two stores sell watermelons. At the first store the melons weigh an average of 22 pounds, with a standard deviation of 3 pounds. At the second store the melons are smaller, with a mean of 19 pounds and a standard deviation of 2 pounds. You select a melon at random at each store. If a Normal model can be used to describe the difference in weights, what's the probability that the melon you got at the first store is heavier?

A) 0.7073 B) 1 C) 0.7373 D) 0.7673 E) 0.7973 F) 0.8273 G) 0.8573 H) 0.8873 I) 0.9173 J) None of the preceding

18. The first store in the previous problem sells watermelons for 32 cents a pound. The second store is having a sale on watermelons—only 25 cents a pound. Find the standard deviation, in cents, of the difference in the price you may pay for melons randomly selected at each store.

A) 101.3 B) 108.3 C) 115.3 D) 122.3 E) 129.3 F) 136.3 G) 143.3 H) 150.3 I) 157.3 J) None of the preceding

19. Suppose that 60% of the women who suspect they may be pregnant and purchase an in-home pregnancy test are actually pregnant. Further suppose that the test is 97% accurate. What's the probability that a woman whose test indicates that she is pregnant actually is?

A) 0.7398 B) 0.7698 C) 0.7998 D) 0.8298 E) 0.8598 F) 0.8898 G) 0.9198 H) 0.9498 I) 0.9798 J) None of the preceding

20. Some probabilities that were simulated back in Chapter 11 can be done exactly by using methods we have learned since then. Here is one: A new electronics store holds a contest to attract shoppers. Once an hour, someone in the store is chosen at random to play the Music Game. Here's how it works. An ace and four other cards are shuffled and placed face down on a table. The customer gets to turn cards over one at a time, looking for the ace. The person gets to win $100 worth of free CDs or DVDs if the ace is the first card, $50 if it is the second card, $20, $10, or $5 if it is the third, fourth, or fifth card chosen. What is the mean dollar amount of music the store will give away each hour?

A) $31 B) $34 C) $37 D) $40 E) $43 F) $46 G) $49 H) $52 I) $55 J) None of the preceding

21. Here is another, but it requires a little cleverness: Many couples want to have a boy and a girl. If they decide to continue to have children until they have at least one child of each sex, what would the mean number of children be? Assume that boys and girls are equally likely, and the sex of each child is independent of the preceding children's sexes.

A) 2.000 B) 2.333 C) 2.667 D) 3.000 E) 3.333 F) 3.667 G) 4.000 H) 4.333 I) 4.667 J) None of the preceding

22. Tell what the following quotation refers to: "For even the most stupid of men … is convinced that the more observations have been made, the less danger there is of wandering from one's goal."

A) BCE B) AUC C) SQR D) LLN E) CLT F) NPQ G) ZED H) TAU I) SPQ J) None of the preceding

23. In an example of a Wash U. survey on gambling just entering the field, there was an issue involving how to reach the universe of Missouri residents 18 and older. As is often the case, it was feasible to sample a large subset of the universe but not the universe itself. What is the technical term for this large subset of the universe?

A) Frame B) Logit C) Probit D) PSU E) MSA F) Census Tract G) Stratum H) Cluster I) PPS J) None of the preceding

24. Suppose a fair coin is flipped 20 times. How many different outcomes (sequences of heads and tails) make up the event 11 Heads, 9 Tails?

A) 137,960 B) 167,960 C) 197,960 D) 227,960 E) 257,960 F) 287,960 G) 317,960 H) 347,960 I) 377,960 J) None of the preceding

25. Many students have a difficult time keeping straight all the probabilities on a tree diagram. For most of them, an artificial crosstable is easier to work with. If we are using such a crosstable to calculate the Bayesian probability P(Disease | Positive Test), and the disease status is represented by the rows, how do we find that probability?

A) Column Percent B) Row Percent C) Column Total D) Row Total E) Regression Intercept F) Regression Slope
G) Cell Mean H) Cell Standard Deviation I) Cell Total J) None of the preceding

26. (The bonus question). In a Dilbert cartoon, we find an employee on the floor doing something to prevent computer viruses. What is she doing?

A) Disconnecting her ethernet cable
B) Spreading flypaper
C) Combing moth eggs out of a wool rug
D) Preparing to sleep overnight
E) Generating static electricity from the wool rug
F) Powering up an external hard drive as a prayer wheel
G) Scrubbing the floor with disinfectant
H) Giving a power cord a spinal adjustment
I) Spreading out all her floppy disks
J) None of the preceding

27. (Another bonus.) A person is dealt a bridge hand (13 cards) from a fully randomized complete deck of 52 cards. The person says, "I have an ace." What is the conditional probability that the person actually has at least two aces?

A) 0.2259 B) 0.2738 C) 0.3217 D) 0.3696 E) 0.4175 F) 0.4654 G) 0.5133 H) 0.5612 I) 0.6091 J) None of the preceding

28. (Yet another bonus.) A person is dealt a bridge hand (13 cards) from a fully randomized complete deck of 52 cards. The person says, "I have the ace of spades." What is the conditional probability that the person actually has at least two aces?

A) 0.2259 B) 0.2738 C) 0.3217 D) 0.3696 E) 0.4175 F) 0.4654 G) 0.5133 H) 0.5612 I) 0.6091 J) None of the preceding