(answers on the back)

1. Suppose that a tire factory wants to set a mileage guarantee on its new model called LA 50 tire. Life tests indicated that the mean mileage is 47,900, and standard deviation of the normally distributed distribution of mileage is 2,050 miles. The factory wants to set the guaranteed mileage so that no more than 5% of the tires will have to be replaced. What guaranteed mileage should the factory announce?

2. One of the side effects of flooding a lake in northern boreal forest areas (e.g. for a hydro-electric project) is that mercury is leached from the soil, enters the food chain, and eventually contaminates the fish. The concentration in fish will vary among individual fish because of differences in eating patterns, movements around the lake, etc. Suppose that the concentration of mercury in individual fish follows an approximate normal distribution with a mean of 0.25 ppm and a standard deviation of 0.08 ppm. Fish are safe to eat if the mercury level is below 0.30 ppm. What proportion of fish is safe to eat?

3. Refer to the previous question. The Department of Fisheries and Oceans wishes to know the mercury level of the top 20% of the fish. The appropriate percentile and mercury level for this lake is:

4. Scores on a Chemistry test follow a normal distribution with a mean of 65 and a standard deviation of 12. What percentage of students have scores below 50?

5. Refer to the preceding question. What is the approximate 90th percentile of the score distribution?

6. The scores on a statistics test are normally distributed with a mean of 62 and a variance of 225. If the instructor wishes to assign B’s or higher to the top 30% of the students in the class, what mark is required to get a B or higher?

7. The distribution of weights of a large group of high school students is normally distributed with μ = 55 kg and standard deviation 5 kg. What is the probability that a randomly chosen high school student weights less than 53.5 kg?

8. In some courses (but certainly not in an intro stats course!), students are graded on a “normal curve”. For example, students within 0.5 standard deviations of the mean receive a C; between 0.5 and 1.0 standard deviations above the mean receive a C+; between 1.0 and 1.5 standard deviations above the mean receive a B; between 1.5 and 2.0 standard deviations above the mean receive a B+, etc. The class average in an exam was 60 with a standard deviation of 10. What are the bounds for a B grade and the percentage of students who will receive a B grade if the marks are actually normal distributed?

9. The diameters of steel disks produced in a plant are normally distributed with a mean of 2.5 cm and standard deviation of .02 cm. Calculate the probability that a disk picked at random has a diameter greater than 2.54 cm.
10. Suppose the test scores of 600 students are normally distributed with a mean of 76 and standard deviation of 8. What is the number of students scoring between 70 and 82?

11. The cost of treatment per patient for a certain medical problem, was modeled by one insurance company as a normal random variable with mean $775 and standard deviation $150. What is the probability that the treatment cost of a patient is less than $1,000, based on this model?

12. The time required to assemble an electronic component is normally distributed with a mean of 12 minutes and a standard deviation of 1.5 min. Find the probability that a particular assembly takes more than 14.25 minutes.

13. The height of an adult male is known to be normally distributed with mean of 175 cm and standard deviation 6 cm. What is the 20th percentile of the distribution of male heights?

14. The heights of students at a college are normally distributed with a mean of 175 cm and a standard deviation of 6 cm. what is the expected number of students in a sample of 1000 students that are shorter than 163 cm is?

15. The height of an adult male is known to be normally distributed with a mean of 69 inches and a standard deviation of 2.5 inches. Calculate the height of the doorway such that 96 percent of the adult males can pass through it without having to bend.

16. The daily milk production of Guernsey cows is approximately normally distributed with a mean of 35 kg/day and a standard deviation of 6 kg/day. What is the probability that a day’s production for a single animal will be less than 28 kg?

17. Refer to the previous question. The producer is concerned when the milk production of a cow falls below the 5th percentile because the animal may be ill. Calculate the 5th percentile (in kg) of the daily milk production.

18. The producer in question 16 wants to breed cows that are in the top 10% of milk production. What production level would warrant the cow being set aside for breeding?

Answers: 1) 44528.050     2) 73.401%     3) 80%, 0.317 ppm     4) 10.565%

5) 80.379     6) 70     7) 0.3821     8) B: 70 – 75 9.185%     9) 0.02275

10) about 328     11) 0.9332     12) 0.0668     13) 169.950 cm     14) 22.75

15) 73.377”     16) 0.1217     17) 25.131 kg     18) 42.689 kg/day