Normal distribution Examples

1) A physical fitness association is including the mile run in its secondary-school fitness test. The time for this event for boys in secondary school is known to possess a normal distribution with a mean of 450 seconds and a standard deviation of 60 seconds. Find the probability that a randomly selected boy in secondary school can run the mile in less than 312 seconds.

        A) .5107 B) .0107 C) .4893 D) .9893

2) The amount of corn chips dispensed into a 20-ounce bag by the dispensing machine has been identified as possessing a normal distribution with a mean of 20.5 ounces and a standard deviation of 0.2 ounce. What proportion of the 20 ounce bags contain more than the advertised 20 ounces of chips?

        A) 0.5062 B) 0.9938 C) 0.4938 D) 0.0062

3) The length of time it takes college students to find a parking spot in the library parking lot follows a normal distribution with a mean of 3.5 minutes and a standard deviation of 1 minute. Find the probability that a randomly selected college student will take between 2.0 and 4.5 minutes to find a parking spot in the library lot.

        A) .2255 B) .7745 C) .0919 D) .4938

4) The amount of soda a dispensing machine pours into a 12 ounce can of soda follows a normal distribution with a mean of 12.54 ounces and a standard deviation of 0.36 ounce. The company receives complaints from consumers who actually measure the amount of soda in the bottles and claim that there was less than the advertised 12 ounces of soda. What proportion of the soda cans contain less than the advertised 12 ounces of soda?

A) .4332 B) .5668 C) .9332 D) .0668

5) The amount of soda a dispensing machine pours into a 12 ounce can of soda follows a normal distribution with a mean of 12.36 ounces and a standard deviation of 0.24 ounce. The cans only hold 12.60 ounces of soda. Every can that has more than 12.60 ounces of soda poured into it causes a spill and the can needs to go through a special cleaning process before it can be sold. What is the probability a randomly selected can will need to go through this process?

A) .8413 B) .1587 C) .6587 D) .3413

6) A new phone system was installed last year to help reduce the expense of personal calls that were being made by employees. Before the new system was installed, the amount being spent on personal calls followed a normal distribution with an average of $ 400 per month and a standard deviation of $50 per month. Refer to such expenses as PCE's (personal call expenses). Using the distribution above, what is the probability that a randomly selected month had a PCE of between $275.00 and $490.00?

        A) .0421 B) .9579 C) .9999 D) .0001

7) A new phone system was installed last year to help reduce the expense of personal calls that were being made by employees. Before the new system was installed, the amount being spent on personal calls follows a normal distribution with an average of $800 per month and a standard deviation of $50 per month. Refer to such expenses as PCE's (personal call expenses). Find the probability that a randomly selected month had a PCE that falls below $650.

A) 0.9987 B) 0.1875 C) 0.0013 D) 0.8125

8) The tread life of a particular brand of tire is a random variable best described by a normal distribution with a mean of 60,000 miles and a standard deviation of 2800 miles. What is the probability a particular tire of this brand will last longer than 57,200 miles?

A) .2266 B) .1587 C) .7266 D) .8413

9) The tread life of a particular brand of tire is a random variable best described by a normal distribution with a mean of 60,000 miles and a standard deviation of 2600 miles. What is the

probability a certain tire of this brand will last between 54,540 miles and 55,320 miles?

A) .9813 B) .4649 C) .4920 D) .0180

10) A physical fitness association is including the mile run in its secondary-school fitness test. The time for this event for boys in secondary school is known to possess a normal distribution with a mean of 450 seconds and a standard deviation of 50 seconds. The fitness association wants to recognize the fastest 10% of the boys with certificates of recognition. What time would the boys need to beat in order to earn a certificate of recognition from the fitness association?

A) 386 seconds B) 532.25 seconds C) 367.75 seconds D) 514 seconds

11) A physical fitness association is including the mile run in its secondary-school fitness test. The time for this event for boys in secondary school is known to possess a normal distribution with a mean of 470 seconds and a standard deviation of 50 seconds. Between what times do we expect most (approximately 95%) of the boys to run the mile?

A) between 372 and 568 seconds B) between 387.75 and 552.28 seconds
C) between 0 and 552.28 seconds D) between 375 and 565 seconds

12) 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 12.26 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?

A) 12.347 B) 12.173 C) 12.087 D) 11.913

13) The amount of soda a dispensing machine pours into a 12 ounce can of soda follows a normal distribution with a standard deviation of 0.02 ounce. Every can that has more than 12.05 ounces of soda poured into it causes a spill and the can needs to go through a special cleaning process before it can be sold. What is the mean amount of soda the machine should dispense if the company wants to limit the percentage that need to be cleaned because of spillage to 3%?

A) 12.0934 ounces B) 12.0066 ounces C) 12.0876 ounces D) 12.0124 ounces

14) A brewery has a beer dispensing machine that dispenses beer into the company's 12 ounce bottles. The distribution for the amount of beer dispensed by the machine follows a normal distribution with a standard deviation of 0.17 ounce. The company can control the mean amount of beer dispensed by the machine. What value of the mean should the company use if it wants to guarantee that 98.5% of the bottles contain at least 12 ounces (the amount on the label)?

A) 12.369 B) 12.001 C) 12.003 D) 12.413

15) The tread life of a particular brand of tire is a random variable best described by a normal distribution with a mean of 60,000 miles and a standard deviation of 2200 miles. What warranty should the company use if they want 96% of the tires to outlast the warranty?

A) 62,200 miles B) 57,800 miles C) 56,150 miles D) 63,850 miles

16) Assume that the salaries of elementary school teachers in the United States are normally distributed with a mean of $26,000 and a standard deviation of $5000. What is the cutoff salary for teachers in the bottom 10%?
A) $17,775 B) $32,400 C) $19,600 D) $34,225

17) A tire company finds the lifespan for one brand of its tires is normally distributed with a mean of 46,500 miles and a standard deviation of 3000 miles. If the manufacturer is willing to replace no more than 10% of the tires, what should be the approximate number of miles for a warranty?

A) 42,660 B) 41,565 C) 43,500 D) 41,200

18. On the Wechsler Adult Intelligence Scale (a standard IQ test) are approximately normally distributed within age groups. For the 20-34 age group, the Scores mean is 110 and the standard deviation is 25. For 60-64 age groups, the mean is 90 and the standard deviation is 25. Sarah is 29 and her mother is 62. Sarah scores 135 on the Wechsler test, while Ann scores 120. Who has the better score, relative to her age group?

19. The length of time needed to complete a certain test is normally distributed with mean 60 minutes and standard deviation 10 minutes.

a) What is the relative frequency of people who take between 45 and 65 minutes to complete the test? Sketch a standard normal curve and shade the area in question.

b) Find the interval that contains the middle 95% of completion times for all people taking the test. Sketch required

20. The Graduate Record Examinations are widely used to help predict the performance of applicants to graduate schools. The range of possible scores on GRE is 200 to 900. The psychology department finds that the scores of its applicants on the quantitative GRE are approximately normal with mean 544 and standard deviation 103. What minimum score would a student need in order to score in the top 10% of those taking the test?