

AP Statistics Practice Test
Unit Two – The Normal Distributions

Name _____ Period _____ Date _____

Vocabulary:

1. The three words that are used to describe the Normal curve are:

_____, _____, and _____

2. State the Empirical Rule.

3. A set of test scores are Normally distributed. Their mean is 100 and standard deviation is 20. These scores are converted to standard Normal z scores. What would be the mean and median of this distribution? What would the new standard deviation be?

The distribution of heights of adult men is approximately Normal with mean 69 inches and standard deviation 2.5 inches.

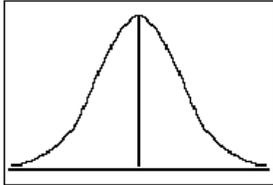
4. Bob's height has a z-score of -2.50 when compared to all adult men. Interpret what this z score tells about how Bob compares to other men in terms of height.

Short Answer:

5. Scores on the Wechsler Adult Intelligence Scale (a standard IQ test) are approximately Normally distributed within age groups. For the 20–34 age group, the mean is 110 and the standard deviation is 25. For the 60–64 age groups, the mean is 90 and the standard deviation is 25. Sarah is 29 and her mother, Ann, is 62. Sarah scores 137 on the Wechsler test, while Ann scores 120. Who has the better score, relative to her age group? Show numerical proof!

6. Use Table A to find the proportions of observations from a standard Normal distribution that satisfy these statements. Also, sketch a standard Normal curve and shade the area under the curve that answers each question.
- (a) $z < -1.15$ (b) The point Z with 20% of the observations falling above it.

7. Find the area under the standard Normal curve corresponding to $-1.25 < z < 0.82$. Show your work on the curve below.



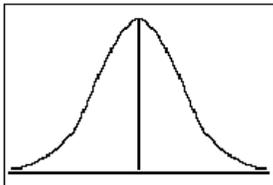
7. _____

8. The heights of American women aged 18 to 24 are approximately Normally distributed with mean 64.5 inches and standard deviation 2.5 inches. Half of all young women are taller than

8. _____

9. Use the information in the previous problem. About 5% of young women have heights outside the range _____.

10. In a Normally distributed population, what percent of the population observations lie within 2.5 standard deviations of the mean? Include the sketch below to illustrate your answer.



10. _____

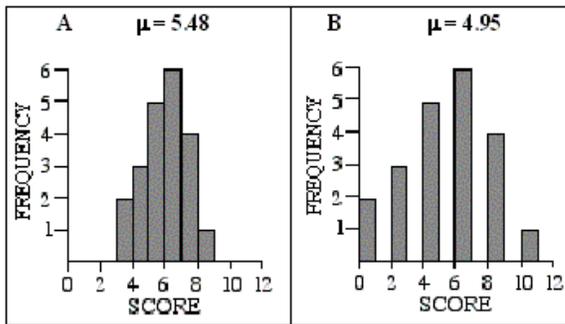
11. The length of time needed to complete a certain test is normally distributed with mean 50 minutes and standard deviation 5 minutes.
- (a) What is the proportion of people who take between 35 and 65 minutes to complete the test? Use your empirical rule and show your curve below.

- (b) Find an interval that contains the middle 68% of completion times for all people taking the test. Sketch required.

Multiple Choice:

12. A set of data are put in numerical order, and a statistic is calculated that divides the data set into two equal parts. Which of the following statistics was computed?
- mean
 - interquartile range
 - standard deviation
 - median
12. _____

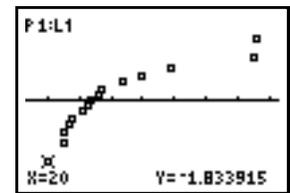
13. For the pair of graphs, determine which graph has the higher standard deviation (it is not necessary to do any calculations to answer this question).



- A has a larger standard deviation than B
- B has a larger standard deviation than A
- Both graphs have the same standard deviation

13. _____

14. The plot shown is a Normal probability plot for a set of data. The data value is plotted on the x-axis, and the standardized value is plotted on the y-axis. Which statement is true for this data set?
- The data are clearly Normally distributed.
 - The data are approximately Normally distributed.
 - The data are clearly skewed to the right.
 - The data are clearly skewed to the left.
 - There is insufficient information to determine the shape of the distribution.



14. _____

15. The distribution of the diameters of a particular variety of oranges is approximately Normal with a standard deviation of 0.3 inch. How does the diameter of an orange at the 67th percentile compare with the mean diameter?
- 0.201 inch below the mean
 - 0.132 inch below the mean
 - 0.132 inch above the mean
 - 0.201 inch above the mean
 - 0.440 inch above the mean
15. _____

16. Let X represent a random variable whose distribution is Normal, with a mean of 100 and a standard deviation of 10. Which of the following is equivalent to $P(X < 115)$?
- $P(X > 115)$
 - $P(X \leq 85)$
 - $P(X < 85)$
 - $P(85 < X < 115)$
 - $1 - P(X < 85)$
16. _____

17. Suppose that the distribution of math SAT scores from your state this year is Normally distributed with mean 480 and standard deviation 100 for males, and mean 440 and standard deviation 120 for females. If someone who scores 780 or higher on the math SAT can be considered a genius, what is the percent of geniuses among the male SAT takers? (Empirical rule)
- a. 0.15%
 - b. 15%
 - c. 0.3%
 - d. 3%
 - e. 1.5%
17. _____

Free Response:

Bigger animals tend to carry their young longer before birth. The length of horse pregnancies from conception to birth varies according to a roughly Normal distribution with mean 336 days and standard deviation 3 days.

18. What percent of horse pregnancies are longer than 340 days?

19. What percent of horse pregnancies are less than 334 days?

20. How long do the longest 20% of pregnancies last?

The lower and upper deciles of any distribution are the points that mark off the lowest 10% and the highest 10%.

21. What are the lower and upper deciles of the standard Normal distribution?

22. The length of human pregnancies is approximately Normal with mean 266 days and standard deviation 16 days. What are the lower and upper deciles of this distribution?

The scores of a reference population on the Wechsler Intelligence Scale for Children (WISC) are Normally distributed with $\mu = 100$ and $\sigma = 15$. A school district classified children as “gifted” if their WISC score exceeds 135. There are 1300 sixth graders in the school district.

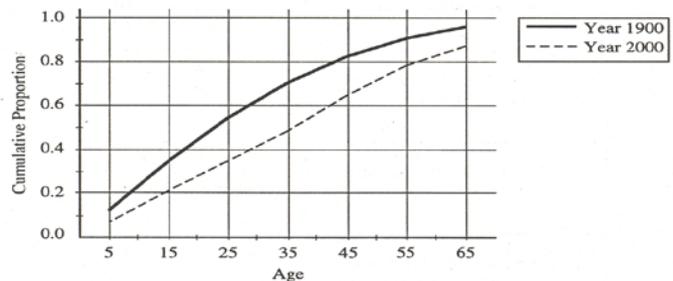
23. About how many of the 1300 sixth graders are “gifted”?

24. What proportion of sixth graders scored between 90 and 122?

25. I would like to recognize the top 10% of the test takers. What scores would qualify for this recognition?

Review:

26. The table of data above provides the cumulative proportions for the United States population at selected ages for the years 1900 and 2000 (projected). For example, 0.344 or 34.4 percent of the population was at or under age 15 in 1900, while only 0.209 or 20.9 percent will be at or under age 15 in the year 2000. The graph below shows the cumulative proportions plotted against age for the years 1900 and 2000 (projected). The data and graph are to be used to compare the age distribution for the year 1900 with the projected age distribution for the year 2000.



(a) Approximate the median age for each distribution.

(b) Approximate the interquartile range for each distribution.

(c) Using the results from parts (a) and (b), write a sentence or two for a history textbook comparing the age distributions for the years 1900 and 2000.