

- Make an appropriate graph to determine if a distribution is bell-shaped.
- Use the 68–95–99.7 rule to assess Normality of a data set.

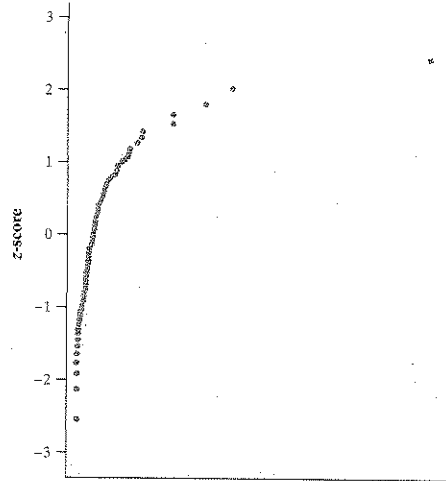
**R2.11 Fruit fly thorax lengths** Here are the lengths in millimeters of the thorax for 49 male fruit flies.<sup>18</sup>

0.64	0.64	0.64	0.68	0.68	0.68	0.72	0.72	0.72	0.72	0.74	0.76	0.76
0.76	0.76	0.76	0.76	0.76	0.76	0.78	0.80	0.80	0.80	0.80	0.80	0.82
0.82	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.88
0.88	0.88	0.88	0.88	0.88	0.88	0.92	0.92	0.92	0.94			

Are these data approximately Normally distributed? Give appropriate graphical and numerical evidence to support your answer.

- Interpret a Normal probability plot.

**R2.12 Assessing Normality** A Normal probability plot of a set of data is shown here. Would you say that these measurements are approximately Normally distributed? Why or why not?



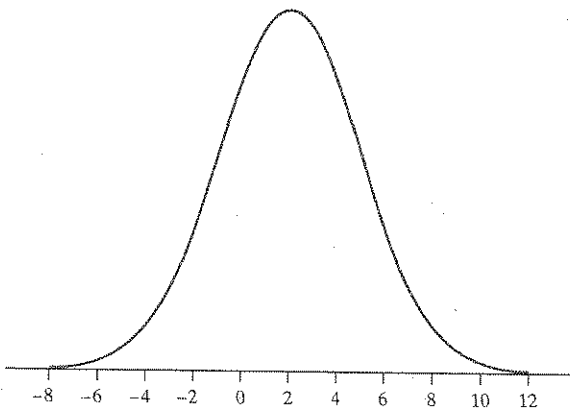
# Chapter 2 AP Statistics Practice Test

## Section I: Multiple Choice *Select the best answer for each question.*

**T2.1.** Many professional schools require applicants to take a standardized test. Suppose that 1000 students take such a test. Several weeks after the test, Pete receives his score report: he got a 63, which placed him at the 73rd percentile. This means that

- (a) Pete's score was below the median.
- (b) Pete did worse than about 63% of the test takers.
- (c) Pete did worse than about 73% of the test takers.
- (d) Pete did better than about 63% of the test takers.
- (e) Pete did better than about 73% of the test takers.

**T2.2.** For the Normal distribution shown, the standard deviation is closest to



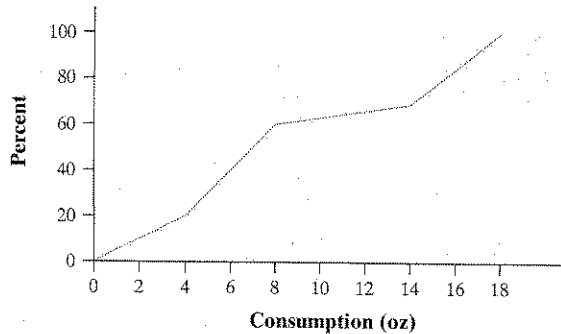
- (a) 0
- (b) 1
- (c) 2
- (d) 4
- (e) 5

**T2.3.** Rainwater was collected in water collectors at 30 different sites near an industrial complex, and the amount of acidity (pH level) was measured. The mean and standard deviation of the values are 4.60 and 1.10, respectively. When the pH meter was recalibrated back at the laboratory, it was found to be in error. The error can be corrected

by adding 0.1 pH units to all of the values and then multiplying the result by 1.2. The mean and standard deviation of the corrected pH measurements are

- (a) 5.64, 1.44
- (b) 5.64, 1.32
- (c) 5.40, 1.44
- (d) 5.40, 1.32
- (e) 5.64, 1.20

**T2.4.** The figure shows a cumulative relative frequency graph of the number of ounces of alcohol consumed per week in a sample of 150 adults. About what percent of these adults consume between 4 and 8 ounces per week?



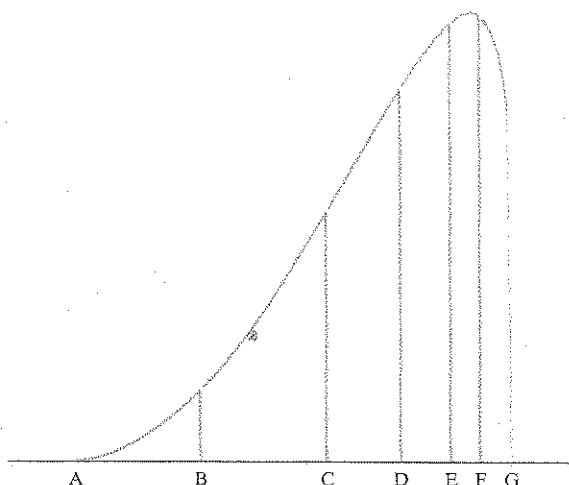
- (a) 20%
- (b) 40%
- (c) 50%
- (d) 60%
- (e) 80%

**T2.5.** The average yearly snowfall in Chillyville is Normally distributed with a mean of 55 inches. If the snowfall in Chillyville exceeds 60 inches in 15% of the years, what is the standard deviation?

- (a) 4.83 inches
- (b) 5.18 inches
- (c) 6.04 inches
- (d) 8.93 inches
- (e) The standard deviation cannot be computed from the given information.

**T2.6.** The figure shown is the density curve of a distribution. Five of the seven points marked on the density curve

make up the five-number summary for this distribution. Which two points are *not* part of the five-number summary?



- (a) B and E      (c) C and E      (e) A and G  
 (b) C and F      (d) B and F

T2.7. If the heights of American men follow a Normal distribution, and 99.7% have heights between 5'0" and 7'0", what is your estimate of the standard deviation of the height of American men?

- (a) 1"    (b) 3"    (c) 4"    (d) 6"    (e) 12"

T2.8. Which of the following is *not* correct about a standard Normal distribution?

- (a) The proportion of scores that satisfy  $0 < z < 1.5$  is 0.4332.  
 (b) The proportion of scores that satisfy  $z < -1.0$  is 0.1587.  
 (c) The proportion of scores that satisfy  $z > 2.0$  is 0.0228.  
 (d) The proportion of scores that satisfy  $z < 1.5$  is 0.9332.  
 (e) The proportion of scores that satisfy  $z > -3.0$  is 0.9938.

*Questions T2.9 and T2.10 refer to the following setting.* Until the scale was changed in 1995, SAT scores were based on a scale set many years ago. For Math scores, the mean under the old scale in the 1990s was 470 and the standard deviation was 110. In 2009, the mean was 515 and the standard deviation was 116.

T2.9. What is the standardized score (*z*-score) for a student who scored 500 on the old SAT scale?

- (a) -30    (b) -0.27    (c) -0.13    (d) 0.13    (e) 0.27

T2.10. Jane took the SAT in 1994 and scored 500. Her sister Colleen took the SAT in 2009 and scored 530. Who did better on the exam, and how can you tell?

- (a) Colleen—she scored 30 points higher than Jane.  
 (b) Colleen—her standardized score is higher than Jane's.  
 (c) Jane—her standardized score is higher than Colleen's.  
 (d) Jane—the standard deviation was bigger in 2009.  
 (e) The two sisters did equally well—their *z*-scores are the same.

**Section II: Free Response** *Show all your work. Indicate clearly the methods you use, because you will be graded on the correctness of your methods as well as on the accuracy and completeness of your results and explanations.*

T2.11. As part of the President's Challenge, students can attempt to earn the Presidential Physical Fitness Award or the National Physical Fitness Award by meeting qualifying standards in five events: curl-ups, shuttle run, sit and reach, one-mile run, and pull-ups. The qualifying standards are based on the 1985 School Population Fitness Survey. For the Presidential award, the standard for each event is the 85th percentile of the results for a specific age group and gender among students who participated in the 1985 survey. For the National award, the standard is the 50th percentile. To win either award, a student must meet the qualifying standard for all five events.

Jane, who is 9 years old, did 40 curl-ups in one minute. Matt, who is 12 years old, also did 40 curl-ups in one minute. The qualifying standard for the Presidential award is 39 curl-ups for Jane and 50 curl-ups for Matt. For the National award, the standards are 30 and 40, respectively.

- (a) Compare Jane's and Matt's performances using percentiles. Explain in language simple enough for someone who knows little statistics to understand.  
 (b) Who has the higher standardized value (*z*-score), Jane or Matt? Justify your answer.

T2.12. The army reports that the distribution of head circumference among male soldiers is approximately Normal with mean 22.8 inches and standard deviation 1.1 inches.

- (a) A male soldier whose head circumference is 23.9 inches would be at what percentile? Show your method clearly.  
 (b) The army's helmet supplier regularly stocks helmets that fit male soldiers with head circumferences between 20 and 26 inches. Anyone with a head circumference outside that interval requires a customized helmet order. What percent of male soldiers require custom helmets? Show your work, including a well-labeled sketch of a Normal curve.  
 (c) Find the interquartile range for the distribution of head circumference among male soldiers. Show your method clearly.

T2.13. A study recorded the amount of oil recovered from the 64 wells in an oil field. Here are descriptive statistics for that set of data from Minitab.

**Descriptive Statistics: Oilprod**

Variable	N	Mean	Median	StDev	Min	Max	Q <sub>1</sub>	Q <sub>3</sub>
Oilprod	64	48.25	37.80	40.24	2.00	204.90	21.40	60.75

Does the amount of oil recovered from all wells in this field seem to follow a Normal distribution? Give appropriate statistical evidence to support your answer.