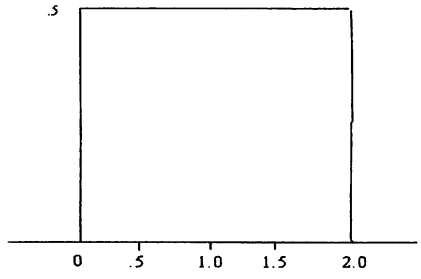
Test 2C AP Statistics Name:

Directions: *Work on these sheets. A standard normal table is attached.*

Part 1: Multiple Choice. *Circle the letter corresponding to the best answer.*

1. A company produces packets of soap powder labeled "Giant Size 32 Ounces." The actual weight of soap powder in a box has a normal distribution with a mean of 33 oz. and a standard deviation of 0.8 oz. What proportion of packets are underweight (i.e., weigh less than 32 oz.)?
   (a) 0.159
   (b) 0.212
   (c) 0.106
   (d) 0.841
   (e) 0.115

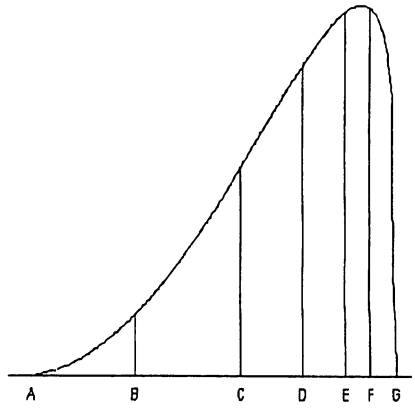
2. The density curve shown to the right takes the value 0.5 on the interval $0 \le x \le 2$, and takes the value 0 everywhere else. What percent of the observations lie above 1.5?
   (a) 20%
   (b) 25%
   (c) 50%
   (d) 75%
   (e) 80%



3. For the above density curve, what percent of the observations lie between 0.5 and 1.2?
   (a) 25%
   (b) 35%
   (c) 50%
   (d) 68%
   (e) 70%

4. If the heights of 99.7% of American men are 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”

5. The figure below 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.
   (b) C and F.
   (c) C and E.
   (d) B and F.
   (e) A and G.

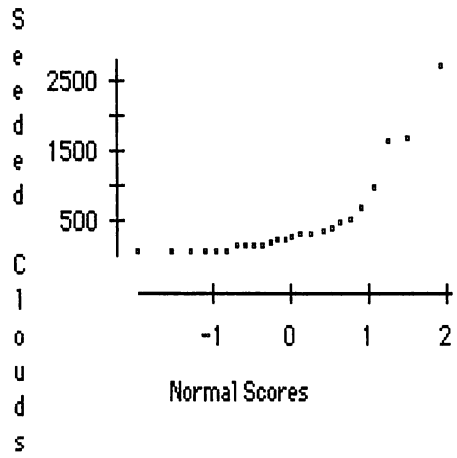


6. Suppose that the distribution of math SAT scores from your state this year is normally distributed with mean 480 and standard deviation 100 for males, and mean 440 and standard deviation 120 for females. If someone who scores 780 or higher on math SAT can be considered a genius, what is the proportion of geniuses among the male SAT takers?

   (a) 28% (b) 14% (b) 3% (d) 1.4% (e) 0.14%

7. 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.

8. The following graph is a normal probability plot for the amount of rainfall in acre-feet obtained from 26 randomly selected clouds that were seeded with silver oxide:



   (a) The data appear to show exponential growth; that is, the amount of rainfall increases exponentially as the amount of silver oxide increases.
   (b) The pattern suggests that the measurement is not normally distributed.
   (c) A least squares regression line should be fitted to the rainfall variable.
   (d) It can be expected that the histogram of rainfall amount will look like the normal curve.
   (e) The shape of the curve suggests that rainfall is caused by seeding the clouds with silver oxide.

9. The five-number summary of the distribution of scores on a statistics exam is

0 26 31 36 50

316 students took the exam. The histogram of all 316 test scores was approximately normal. Thus the variance of test scores must be about

(a) 5
(b) 8
(c) 19
(d) 64
(e) 55

10. If the median of a set of data is equal to the mean, then

(a) The data are normally distributed.
(b) The data are approximately normally distributed.
(c) The distribution is skewed.
(d) The distribution is symmetric.
(e) One can't say anything about the shape of the distribution with any certainty.

Part 2: Free Response

Answer completely, but be concise. Write sequentially and show all steps.

11. (a) The National Collegiate Athletic Association (NCAA) requires Division I athletes to score at least 820 on the combined mathematics and verbal parts of the SAT exam in order to compete in their first college year. (Higher scores are required for students with poor high school grades.) In 1999, the scores of the more than one million students taking the SATs were approximately normal with mean 1017 and standard deviation 209. What percent of all students had scores less than 820?

(b) The NCAA considers a student a "partial qualifer" eligible to practice and receive an athletic scholarship, but not to compete, if the combined SAT score is at least 720. Use the information in the previous exercise to find the percent of all SAT scores that are less than 720.

12. 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. Use the 68-95-99.7 rule to answer the following questions.

(a) Almost all (99.7%) of horse pregnancies fall in what range of lengths?

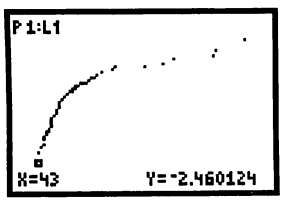
(b) What percent of horse pregnancies are longer than 339 days?

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

(a) What are the lower and upper deciles of the standard normal distribution?

(b) 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?

14. A normal probability plot of the survival times of the guinea pigs in a medical experiment is shown below. Use this plot to describe the shape of the distribution of survival times. Then explain carefully how this shape is seen in the normal probability plot.



I pledge that I have neither given nor received aid on this test. _____

Test 2C

(1) c (2) b (3) b (4) c (5) d (6) e (7) a (8) b (9) e (10) e

(11a) $X < 820$ corresponds to $Z < -0.9426$. From the calculator, the area to the left of $Z = -0.9426$ is 0.1729, or 17.3% of the data. (11b) $X < 720$ corresponds to $Z < -1.4211$. The area to the left of $Z = -1.4211$ is 0.07765 or 7.77%. (12a) $336 \pm 3\sigma$, or between 327 and 345 days. (12b) 16%. (13a) From Table A, the area to the left of 1.28 is 0.90. So the two values are ± 1.28. (13b) Substituting into the standard form $Z = (X - \mu)/\sigma$, we obtain $1.28 = (X - 266)/16$, so $X = 286.48$ days. (14) The distribution of survival times is strongly skewed right. If the distribution of survival times were normal, then the points would appear in a straight line. Because the points in the normal probability plot bend sharply around to the right for larger values of X, we conclude that the data are skewed to the right.