Chapter 2 Test Review

Multiple Choice Questions

1. John recently scored 113 on a particular standardized achievement test. The scores on the test are distributed with a mean of 100 and a standard deviation of 10. His cousin, Brandon, took a different standardized test and scored 263. The scores on Brandon's test have a mean of 250 and a standard deviation of 25. Which student did relatively better on his particular test?

John
$$Z = \frac{113-100}{10} = 1.3$$

Brandon
$$Z = \frac{263-250}{25} = .52$$

A) John did better on his test.
B) Brandon did better on his test.
C) They both performed equally as well on their respective tests.
D) It is impossible to tell since they did not take the same test.
E) It is impossible to tell since the number of students taking the test is unknown.

2. A distribution of scores has a mean of 60 and a standard deviation of 18. If each score is doubled, and then 5 is subtracted from that result, what will be the mean and standard deviation of the new scores?

A) Mean = 115, standard deviation = 31
B) Mean = 115, standard deviation = 36
C) Mean = 120, standard deviation = 6
D) Mean = 120, standard deviation = 31
E) Mean = 120, standard deviation = 36

$$60(2) - 5 = 115$$
$$18(2) = 36$$

3. A certain variety of table grapes has fruit diameters that are distributed normally with mean 13 mm and standard deviation 2 mm. Approximately what proportion of grapes have diameters between 12 mm and 16 mm?

A) 0.134
B) 0.378
C) 0.500
D) 0.625
E) 0.683

$$Z = \frac{12-13}{2} = -.5 \rightarrow .3085$$

$$Z = \frac{16-13}{2} = 1.5 \rightarrow .9332$$

$$P(-.5 < Z < 1.5) = .9332 - .3085 = .6247$$

4. In a recent high school basketball tournament where over 750 games were played, the mean team score was 68 points and the standard deviation was 13 points. The scores were approximately normally distributed. A coach was overheard saying that his team scored 95 points in one game. About what proportion of teams' scores during the tournament were more than 95 points?

   A) 0.0035
   B) 0.0190
   C) 0.05
   D) 0.9810
   E) 2.07

$$Z = \frac{95-68}{13} = 2.07 \qquad P(Z>2.07) = 1-.9808 = .0192$$

5. Allison and her twin sister Brenda both take AP European History. Allison is in the morning class while Brenda is in the afternoon class. On the final exam, Allison received a score of 89 where the scores had a mean of 87 and a standard deviation of 3. Brenda received a score of 90 on the same test except that her class scores had a mean of 89 with a standard deviation of 5. Which statement is true concerning the scores of the sisters relative to the scores on their own classes?

   A) Brenda had a higher score on the test and therefore performed better relative to her own classmate's score.
   B) Allison performed better relative to her own classmate's scores.
   C) Allison and Brenda performed equally as well relative to their own classmate's scores.
   D) We cannot compare their scores since they are in different classes.
   E) We do not know how many students are in each class, so any comparison may not be fair.

Allison: $z = \frac{89-87}{3} = .667$

Brenda: $z = \frac{90-89}{5} = .2$

6. Mary's best time for downhill skiing the challenging course has a z-score of 0.5 as compared to all skiers that are timed on the same course. Which statement best interprets her z-score?

   A) Mary's time is 0.5 times faster than all skiers timed on the same course.
   B) Mary's time is 0.5 seconds faster than all skiers timed on the same course.
   C) Mary's time is 0.5 standard deviations below the mean time for all skiers timed on the same course.
   D) Mary's time is 0.5 standard deviations above the mean time for all skiers timed on the same course.
   E) Mary skis worse than the majority of the skiers timed on the same course.

7. The weights of young-of-the-year moose are normally distributed with a mean of 430 pounds and a standard deviation of 42 pounds. Between what two values is the middle half of all young-of-the-year moose weights?

$-.67 = \frac{x-430}{42}$ $.67 = \frac{x-430}{42}$

A) 304 pounds to 556 pounds
B) 346 pounds to 514 pounds
C) 388 pounds to 42 pounds
D) 402 pounds to 458 pounds
E) 409 pounds to 451 pounds

$-28.14 = x-430$ $28.14 = x-430$

$401.86 = x$ $458.14 = x$

25% and 75%

8. A student recently took a standardized mathematics exam to measure academic knowledge. This exam is used to qualify candidates for admission to a college mathematics program. The student's exam results were given as follows:

Raw Score	Percentile
45	90

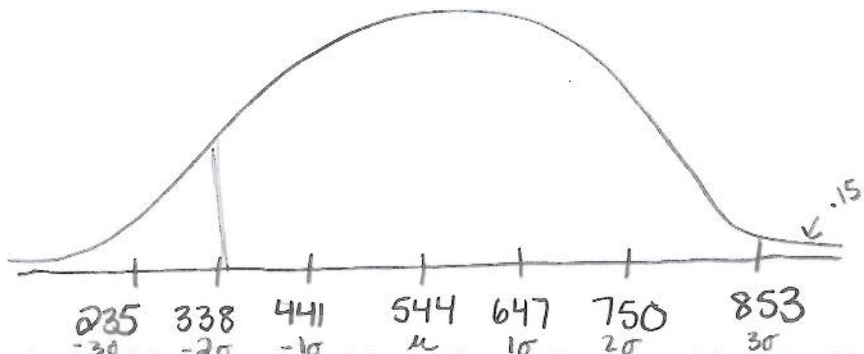
Based on the test results shown, which of the following statements must be true?

A) There were 50 questions on the test.
B) The student answered 90% of the questions correctly.
C) The student scored higher than 90% of all those who took the test.
D) Each question was worth 2 points.
E) There is a 90% chance that the student will be accepted into the math program.

Free Response Questions

1. The Graduate Record Examinations are widely used to help predict the performance of applicants to graduate schools. The range of possible scores on a GRE is 200 to 900. The psychology department at a university finds that the scores of its applicants on the quantitative GRE are approximately normal with mean = 544 and standard deviation = 103.

   A) Make an accurate sketch of the distribution of these applicants' GRE scores. Be sure to provide a scale on the horizontal axis.



   B) Use the 68-95-99.7 rule to find the proportion of the applicants whose score is between 338 and 853.

$$47.5 + 49.85 = \boxed{97.35\%}$$

   C) What proportion of GRE scores are below 500?

$$P(X < 500) = P(Z < -.43) = .3336$$

$$Z = \frac{500-544}{103} = -.43$$

$$\boxed{33.36\%}$$

   D) What proportion of GRE scores are above 800?

$$Z = \frac{800-544}{103} = 2.49$$

$$P(X > 800) = P(Z > 2.49) = 1 - .9936 = .0064$$

$$\boxed{0.64\%}$$

   E) Calculate and interpret the 34th percentile of the distribution of applicants' GRE scores.

$$-.41 = \frac{X-544}{103}$$

$$-42.23 = X - 544$$

$$501.77 = X$$

About 34% of the applicants have GRE scores below 502.

2. The Dow Jones Industrial Average ("The Dow") is an index measuring the stock performance of 30 large American companies, and is often used as a measure of overall economic growth in the United States. Below is a Minitab output describing the daily percentage changes in the Dow for the first three months of 2009 and the first three months of 2010. (Note that the market was open for 61 days during the first three months of each year. A negative value indicates a percentage decrease in the index for that day.)

Descriptive Statistics: Dow 2009, Dow 2010

Variable	N	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Dow 2009	61	-0.198	2.331	-4.600	-1.530	-0.310	1.150	6.820
Dow 2010	61	0.078	0.821	-2.640	-0.270	0.110	0.465	1.660

Both distributions are approximately normally distributed.

A) Consider a day when the Dow increased by 1%. In which year, 2009 or 2010, would such a day be considered a better day for the stock market, relative to other days in that year? Provide appropriate statistical calculations to support your answer.

2009

$$Z = \frac{1-(-.198)}{2.331} = 0.514$$

1% had a higher relative standing in 2010 than in 2009.

2010

$$Z = \frac{1-.078}{0.821} = 1.123$$

B) ~~Based on these data, estimate the number of days that the Dow decreased by more than 1% in these 61 days.~~

B) Estimate the 19th percentile of daily change for the first three months of 2010.

$$-.88 = \frac{x-.078}{.821}$$

$$-.72248 = x-.078$$

$$-.64448 = x$$

About a 0.64% decrease

3. "Normal" body temperature varies by time of day. A series of reading was taken of the body temperature of a subject. The mean reading was found to be 36.5°C with a standard deviation of 0.3°C. If you wanted to convert the temperature to the Fahrenheit scale, what would the new mean and standard deviation be? (Note: $°F = °C(1.8) + 32$).

mean: $36.5(1.8)+32 = 97.7°F$

Standard deviation: $0.3(1.8) = .54°F$

4. A local post office weights outgoing mail and finds that the weights of first-class letter is approximately Normally distributed with a mean of 0.69 ounces and a standard deviation of 0.16 ounces.

A) What is the 60th percentile of first-class letter weights?

$$.25 = \frac{x - .69}{.16}$$

$$.04 = x - .69$$

$$.73 = x$$

$\boxed{\text{73 ounces}}$

B) First-class letters weighing more than 1 ounce require additional postage. What proportion of first-class letters at this post office require additional postage?

$$z = \frac{1 - .69}{.16} = 1.9375$$

$P(x>1) = P(z>1.9375) =$

$1 - .9738 = .0262$

$\boxed{\text{About 2.62\%.}}$