

# HW #96

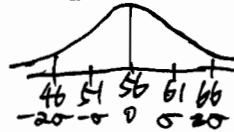
## MR12 Worksheet (Normal Distribution) (Key)

P.1

1. The mean of a normally distributed set of data is 56, and the standard deviation is 5. In which interval do approximately 95.4% of all cases lie?

- (1) 46-56      (2) 51-61      (3) 46-66      (4) 56-71

since 95.4% is about 2σ,



46-66

2. The amount of juice dispensed from a machine is normally distributed with a mean of 10.50 ounces and a standard deviation of 0.75 ounce. Which interval represents the amount of juice dispensed about 68.2% of the time?

- (1) 9.00-12.00      (2) 9.75-11.25      (3) 9.75-10.50      (4) 10.50-11.25

68.2% is 1σ, so,  $10.5 + 0.75 = 11.25$   
 $10.5 - 0.75 = 9.75$ ,  $9.75 - 11.25$

3. In a New York City high school, a survey revealed the mean amount of cola consumed each week was 12 bottles and the standard deviation was 2.8 bottles. Assuming the survey represents a normal distribution, how many bottles of cola per week will approximately 68.2% of the students drink?

- (1) 6.4 to 12      (2) 9.2 to 14.8      (3) 6.4 to 17.6      (4) 12 to 20.4

68.2% again, is 1σ,  $12 + 2.8 = 14.8$   
 $12 - 2.8 = 9.2$       9.2 - 14.8

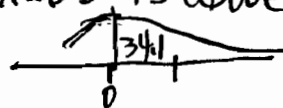
4. On a standardized test, the distribution of scores is normal, the mean of the scores is 75, and the standard deviation is 5.8. If a student scored 83, the student's score ranks

- (1) below the 75th percentile      (2) between the 75th percentile and the 84th percentile  
 (3) between the 84th percentile and the 97th percentile      (4) above the 97th percentile

$83 - 75 = 8$

$8 \div 5.8 = 1.38\sigma$

1.38σ is above 84% (50+34)=84%

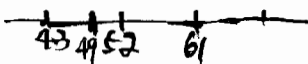


so (3) is the best choice

5. Scores on PSAT range from 20 to 80. For a certain population of students, the mean is 52 and the standard deviation is 9.

How many standard deviations from the mean for a) 49    b) 56    c) 64    d) 65?

- (a) -1/3    (b) 4/9    (c) 4/3    (d) 13/9

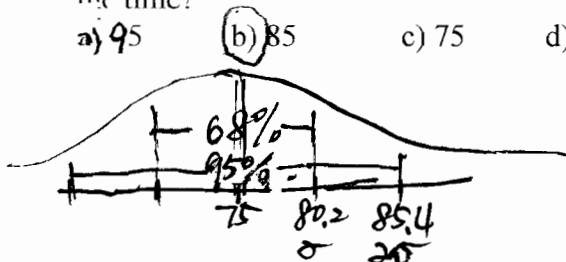


a)  $49 - 52 = -3$   
 $\frac{-3}{9} = -\frac{1}{3}\sigma$

b)  $56 - 52 = 4$     c)  $64 - 52 = 12$     d)  $65 - 52 = 13$   
 $4 \div 9 = \frac{4}{9}\sigma$      $\frac{12}{9} = \frac{4}{3} = 1\frac{1}{3}\sigma$      $\frac{13}{9} = 1\frac{4}{9}\sigma$

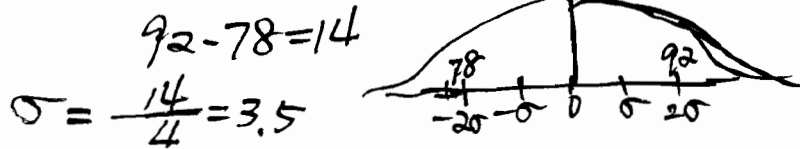
6. In a standardized test with a normal distribution of scores, the mean was 75 and the standard deviation was 5.2. Which score could be expected to occur less than 5% of the time?

- a) 95    (b) 85    c) 75    d) 65



$75 + 2(5.2) = 85.2$

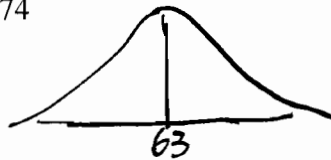
7. In the diagram, the shaded region represents approximately 95% of the scores on a standardized test. If these scores ranged from 78 to 92, what would be the standard deviation?



8. In a standardized test with a normal distribution of scores, the mean is 63 and the standard deviation is 5. Which score could be expected to occur most often?

- a) 45      b) 55      c) 63      d) 74

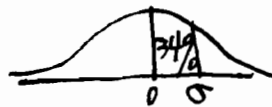
the closer to the mean  
the higher frequency it gets.



9. Battery lifetime is normally distributed for large samples. The mean lifetime is 500 days and the standard deviation is 61 days. Approximately what percent of batteries have lifetimes longer than 561 days?

- (1) 16%      (2) 68%      (3) 34%      (4) 84%

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$50\% + 34\% = 84\%$        $100 - 84 = 16\%$

10. The national mean for verbal scores on an exam was 428 and the standard deviation was 113. Approximately what percent of those taking this test had verbal scores between 315 and 541?

- (1) 68.2%      (2) 52.8%      (3) 38.2%      (4) 26.4%

$428 + 113 = 541$   
 $428 - 113 = 315$

exactly within 15.

11. Twenty high school students took an examination and received the following scores:

70, 60, 75, 68, 85, 86, 78, 72, 82, 88, 88, 73, 74, 79, 86, 82, 90, 92, 93, 73

Determine what percent of the students scored within one standard deviation of the mean. Do the results of the examination approximate a normal distribution? Justify your answer.

mean = 79.7,      standard deviation = 8.7  
 the range of one standard deviation is from 71 to 88.4  
 $14/20 = 70\%$

Yes, since 68% of scores fall within one standard deviation from the mean for a normal distribution.

12. Mrs. Ramírez is a real estate broker. Last month, the sale prices of homes in her area approximated a normal distribution with a mean of \$150,000 and a standard deviation of \$25,000.

A house had a sale price of \$175,000. What is the percentile rank of its sale price, to the nearest whole number? Explain what that percentile means.

Mrs. Ramírez told a customer that most of the houses sold last month had selling prices between \$125,000 and \$175,000. Explain why she is correct.

\$175,000 is on the one standard deviation, therefore is on 84% percentile.

There is 84% percent of houses sold for less than or equal to \$175,000

\$125,000 to \$175,000 is the range of one standard deviation which has 68% of probability to be occurred.



7. In the diagram, the shaded region represents approximately 95% of the scores on a standardized test. If these scores ranged from 78 to 92, what would be the standard deviation?
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