Data Analysis and Statistical Inference
Dr. Çetinkaya-Rundel
Duke University

In-Video Quiz Questions for Unit 2: Part 3 – (1) Normal Distribution

(03:31) – slide 5, after "But these occurrences are very rare if the data are nearly normal."

1. SAT scores are distributed nearly normally with mean 1500 and standard deviation 300. According to the 68-95-99.7% rule, which of the following is false?

(a) Roughly 68% of students score between 1200 and 1800 on the SAT.

(b) Roughly 95% of students score between 900 and 2100 on the SAT.

(c) Roughly 99.7% of students score between 600 and 2400 on the SAT.

(d) No students can score below 600 on the SAT.

(09:03) – slide 9, after "But we're going to talk about why we brought this up within the context of normal distributions in a moment."

2. Scores on a standardized test are normally distributed with a mean of 100 and a standard deviation of 20. If these scores are converted to standard normal Z scores, which of the following statements will be correct?

(a) The mean will be 0, and the median should be roughly 0 as well.

(b) The mean will equal 0, but the median cannot be determined.

(c) The mean of the standardized Z scores will equal 100.

(d) The mean of the standardized Z scores will equal 5.

(14:38) – slide 14, after "So, Pam scored worse than 1 minus 0.8413, which amounts to 15.87% of the test takers."

3. ACT scores are distributed nearly normally with mean 21 and standard

deviation 5. Jim, who scored a 24 on his ACT. Which of the following is true?

You can use R, the distribution calculator applet (http://spark.rstudio.com/minebocek/dist_calc/) or the normal probability table (https://www.openintro.org/download.php?file=os2_prob_tables&referrer=coursera.php) to answer this question.

(a) Jim's Z score is -0.6

(b) Jim scored better than approximately 72.57% of ACT takes.

(c) 72.57% of ACT takes scored better than Jim.

(d) Jim's percentile score is 60%.

(17:18) – slide 15, after "And the result is the same with either approach, 1884."

4. ACT scores are distributed nearly normally with mean 21 and standard deviation 5. A friend of yours tells you that she scored in the bottom 10% on the ACT. What is the highest possible score she could have gotten? Choose the closest answer.

You can use R, the distribution calculator applet (http://spark.rstudio.com/minebocek/dist_calc/) or the normal probability table (https://www.openintro.org/download.php?file=os2_prob_tables&referrer=coursera.php) to answer this question.

(a) 14.6

(b) 27.4

(c) 12.75

(d) 29.25

Answers:

1. d
2. a
3. b

Explanation: $Z = (24 - 21) / 5 = 0.6 \rightarrow P(Z < 0.6) = 0.7257$

Jim's percentile score is 72.57%, so he scored better than 72.57% of ACT takers.

4. a

Explanation: The Z score cut-off for the bottom 10% is $Z=-1.28$, therefore

$-1.28=(X-21)/5 \rightarrow X=-1.28\times5+21=14.6$