Questions 3 and 4: ACT scores, part 2

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Assessment due Mar 17, 2021 04:40 IST Completed

In this 3-part question, you will convert raw ACT scores to Z-scores and answer some questions about them.

Convert `act_scores` to Z-scores. Recall from Data Visualization (the second course in this series) that to standardize values (convert values into Z-scores, that is, values distributed with a mean of 0 and standard deviation of 1), you must subtract the mean and then divide by the standard deviation. Use the mean and standard deviation of `act_scores`, not the original values used to generate random test scores.

Question 3a

1.0/1.0 point (graded)

What is the probability of a Z-score greater than 2 (2 standard deviations above the mean)?

0.0233 ✔

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Question 3b

1.0/1.0 point (graded)

What ACT score value corresponds to 2 standard deviations above the mean (Z = 2)?

32.1906 ✔

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Question 3c

1.0/1.0 point (graded)

A Z-score of 2 corresponds roughly to the 97.5th percentile.

Use `qnorm()` to determine the 97.5th percentile of normally distributed data with the mean and standard deviation observed in `act_scores`.

What is the 97.5th percentile of `act_scores`?

What is the 97.5th percentile of `act_scores` ?

31.96338 ✔

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In this 4-part question, you will write a function to create a CDF for ACT scores.

Write a function that takes a value and produces the probability of an ACT score less than or equal to that value (the CDF). Apply this function to the range 1 to 36.

Question 4a

1.0/1.0 point (graded)

What is the minimum integer score such that the probability of that score or lower is at least .95?

Your answer should be an integer 1-36.

31 ✔

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Question 4b

1.0/1.0 point (graded)

Use `qnorm()` to determine the expected 95th percentile, the value for which the probability of receiving that score or lower is 0.95, given a mean score of 20.9 and standard deviation of 5.7.

What is the expected 95th percentile of ACT scores?

30.27567 ✔

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Question 4c

1.0/1.0 point (graded)

As discussed in the Data Visualization course, we can use `quantile()` to determine sample quantiles from the data.

Make a vector containing the quantiles for `p <- seq(0.01, 0.99, 0.01)` , the 1st through 99th percentiles of the `act_scores` data. Save these as `sample_quantiles` .

In what percentile is a score of 26?

Your answer should be an integer (i.e. 60), not a percent or fraction. Note that a score between the 98th and 99th percentile should be considered the 98th percentile, for example, and that quantile numbers are used as names for the vector `sample_quantiles` .

82 ✔

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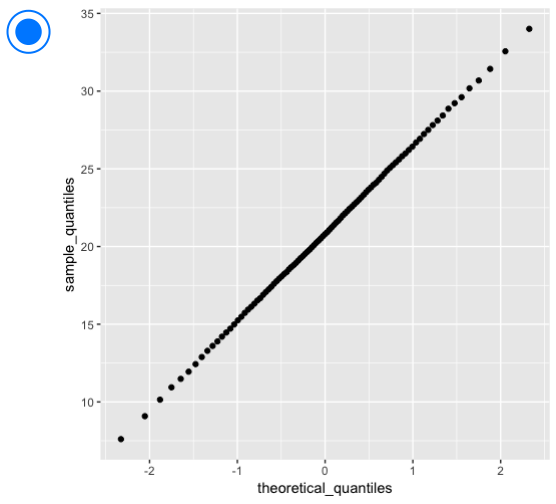
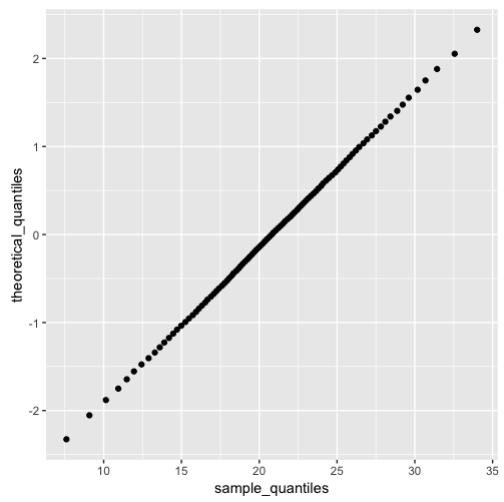
Question 4d

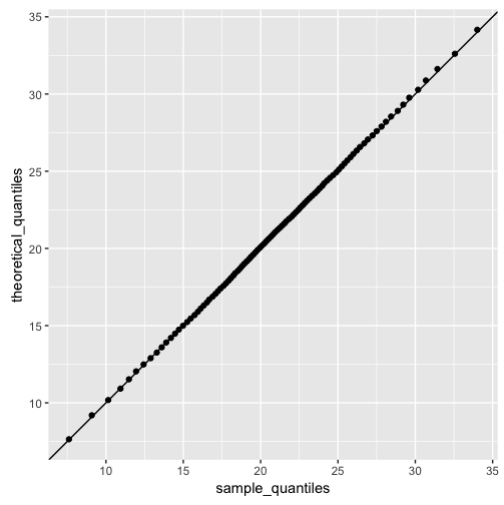
0.0/1.0 point (graded)

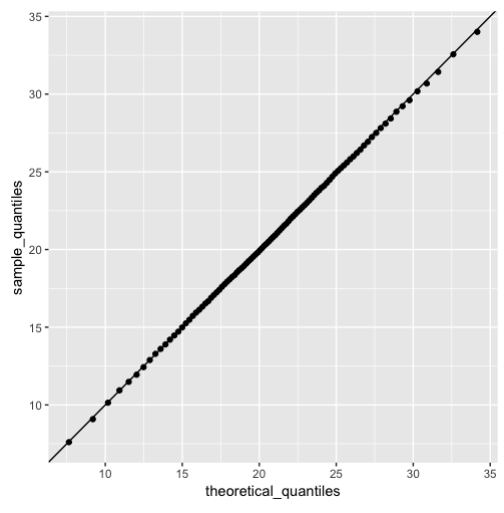
Make a corresponding set of theoretical quantiles using `qnorm()` over the interval `p <- seq(0.01, 0.99, 0.01)` with mean 20.9 and standard deviation 5.7. Save these as `theoretical_quantiles`. Make a QQ-plot graphing `sample_quantiles` on the y-axis versus `theoretical_quantiles` on the x-axis.

Which of the following graphs is correct?









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