Normal Calculations with z-scores

18. Maria made 75% on her Government test and 83% on her Algebra 2 test. The mean grade on the Government test was 72% with a standard deviation of 5%. The average grade on the Algebra 2 test was 81% with a standard deviation of 4%. On which test did Maria do better? Justify your answer.

\[
\text{Gov: } Z = \frac{75 - 72}{0.05} = 6 \\
\text{Alg: } Z = \frac{83 - 81}{0.04} = 5
\]

She did better on the Government test since she placed higher relative to the rest of the class.

19. For a standard normal distribution, the mean \( \mu \) is always \( \text{O} \) and the standard deviation \( \sigma \) is always \( \text{I} \).

For #20 - 25: Use Table A (Standard Normal Distribution) to find the proportion of observations that satisfies each of the following statements. In each case, shade the area under the curve that is the answer to the question.

20. \( z \) is less than -1.83

\( 0.0336 \)

21. \( z \) is greater than 2.18

\( 0.0146 \)

22. \( z \) is less than 0.33

\( 0.6293 \)

23. \( z \) is between 1.42 and 2.68

24. \( z \) is greater than -0.51

25. \( z \) is between -2 and 1.53

\( 0.9963 - 0.9222 = 0.0741 \)

\( 0.3060 = 0.6940 \)

\( 0.9370 - 0.0228 = 0.9142 \)

For #26-30: Use Table A (backwards) to find the z-score(s) for each proportion.

26. What z-score represents the 90\(^{th}\) percentile? \( \approx 1.28 \)

27. What z-score represents the 10\(^{th}\) percentile? \( \approx -1.28 \)

28. What z-score represents the 37\(^{th}\) percentile? \( \approx -1.33 \)

29. What z-score has 41 percent of observations above it? \( \approx 0.23 \)

30. Two z-scores are equidistant from the mean (one on each side of the mean). The proportion of observations between the two z-scores is 0.86. What are the two z-scores?

\( -1.48 \) and \( 1.48 \)