A random sample of the ACT scores of 400 students at Big State University provided a sample mean score of 22.48 with a sample standard deviation of 5.76. Find the p-value when testing the claim that μ, the population mean ACT score, is greater than 22.

.024 .048 .096 .192 .256

Solution

Evidence: $n = 400, \ \bar{x} = 22.48, s = 5.76.$ If the sample size is large (n=400), then apply normal approximation and compute the statistic:

$$z = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}} = \frac{22.48 - 22}{\frac{5.76}{\sqrt{400}}} = 1.6666.$$

Compute $p - value = P(z > 1.6666) = 1 - P(z \le 1.6666) = 0.047797 \approx 0.048$

(via Excel "=1-NORMSDIST(1,6666)"). We can see p-value<$\alpha = 0.05$. In similar way we can test other values of μ.

Answer: 0.048.