An admissions officer at a small college took a sample of 20 freshmen GPAs at the end of the first year and their ACT scores to evaluate if he can predict the GPA from ACT. The data are in the MINITAB project file cor−hwk−data.MPJ on the class web cite.

1. Test if the Pearson correlation coefficient between ACT and GPA is significantly different from zero.

From MINITAB: Correlation of GPA and ACT = 0.152, \( P\)-Value = 0.521

\[ H_0: r_p = 0 \quad H_a: r_p \neq 0 \]

Test statistic is \( t = 0.6541 \), df = 18.

**Decision: Do not reject Ho.**

**Conclusion: Pearson correlation coefficient \( r \) is not significantly different from zero.**

2. Test if the Spearman correlation coefficient between ACT and GPA is significantly different from zero.

MINITAB: Spearman correlation between GPA and ACT is 0.218, \( P\)-Value = 0.356

\[ H_0: r_p = 0 \quad H_a: r_p \neq 0 \]

Test statistic is \( t = 0.9472 \), p-value = 0.356

**Decision: Do not reject Ho.**

**Conclusion: Spearman correlation coefficient \( \rho \) is not significantly different from zero.**

3. Test if the Kendall correlation coefficient between ACT and GPA is significantly different from zero.

Number of concordant pairs: \( P=112 \), discordant pairs: \( M=190-112=78 \)
\( S=112-78=34 \)
\( \tau=(112-78)/190=0.1789474 \)

\[ H_0: \tau = 0 \quad H_a: \tau \neq 0 \]

Use normal approximation for testing, since sample size is over 10.

Test statistic is normal: \( z = 1.1031 \), p-value = 0.27

**Decision: Do not reject Ho.**

**Conclusion: Kendall correlation coefficient \( \tau \) is not significantly different from zero.**

**NOTE:** For all testing hypotheses please make sure that you write down precise statements of your null and alternative hypotheses and conclusion from the test. In particular, please answer the question: Is the Pearson/Spearman/Kendall correlation coefficient significantly different from zero? You must also write the value of the test statistic, and p-value for every test. Use significance level = 0.05 for all tests.