Hand your completed quiz in before the due date. Do not forget to write down your name and student ID number. Marks will be awarded for this quiz based on the clarity of your answers. The marker will pay close attention to the logic of your answers. Please show all your working.

Q.1 Draw a scatter diagram of the following bivariate data.

\[
\begin{array}{cccccccc}
1 & 3 & 5 & 7 \\
2 & 3 & 4 & 4
\end{array}
\]

(a) Calculate the covariance.

(b) Calculate \( s_x \) and \( s_y \).

(c) Find \( r \). What can you conclude on the relationship between \( x \) and \( y \)? Check your answer with Excel. (Use Correlation inside Data Analysis.)

(d) Find the line of best fit and use Excel (Regression inside Data Analysis) to check your answer. Also check that the line goes through the point \((\bar{x}, \bar{y})\).

Q.2 Use Table 10 in the textbook to determine the 95% confidence interval for the population linear correlation coefficient \( \rho \) based on the following sample data:

(a) \( n = 50, r = 0.6 \).

(b) \( n = 12, r = -0.45 \).

(c) \( n = 6, r = 0.8 \).

(d) \( n = 200, r = -0.56 \).

Q.3 The test-retest method is one way of establishing the reliability of a test. The test is administered, and then, at a later date, the same test is readministered to the same people. The correlation coefficient is computed between the two sets of scores. The result is the following:

<table>
<thead>
<tr>
<th>First Score</th>
<th>75</th>
<th>87</th>
<th>60</th>
<th>75</th>
<th>98</th>
<th>80</th>
<th>68</th>
<th>84</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Score</td>
<td>72</td>
<td>90</td>
<td>52</td>
<td>75</td>
<td>94</td>
<td>78</td>
<td>72</td>
<td>80</td>
</tr>
</tbody>
</table>

Find \( r \) and the 95% confidence interval for the population linear correlation coefficient \( \rho \).

Q.4 Determine the \( p \)-value that would be used in the following hypothesis test:

(a) \( H_0 : \rho = 0 \) vs. \( H_a : \rho \neq 0 \), with \( n = 32 \) and \( r = 0.41 \).

(b) \( H_0 : \rho = 0 \) vs. \( H_a : \rho > 0 \), with \( n = 9 \) and \( r = 0.75 \).

(c) \( H_0 : \rho = 0 \) vs. \( H_a : \rho < 0 \), with \( n = 15 \) and \( r = -0.83 \).

Q.5 If a sample of size 18 has a linear correlation coefficient of \(-0.50\), is there an enough reason to conclude that the linear correlation coefficient of the population is negative? Use \( \alpha = 0.01 \).