1. **Sln:**
   a) \( n = 4 \)  
      \[ C = 2 : \{(1,2),(2,4)\}, \{(1,2),(3,3)\}; \]  
      \[ D = 4 : \{(1,2),(4,1)\}, \{(2,4),(3,3)\}, \{(2,4),(4,1)\}, \{(3,3),(4,1)\} \]  
      Therefore, \( \tau = \frac{2(C - D)}{n(n-1)} = \frac{2(2-4)}{4(4-1)} = -\frac{1}{3} \).
   
   b) \( n = 4, \ D = 0; \ C = 6 : \{(3.4,4.5),(6.2,4.5)\}, \{(3.4,4.5),(3.17,3.1)\}, \{(3.4,4.5),(2.4,1.7)\}, \{(6.2,4.5),(3.17,3.1)\}, \{(6.2,4.5),(2.4,1.7)\}, \{(3.17,3.1),(2.4,1.7)\} \]  
      Therefore, \( \tau = \frac{2(C - D)}{n(n-1)} = \frac{2(6-0)}{4(4-1)} = 1 \).

2. **Sln:**
   a) \( g(x) = x_i; f(y) = y_i + 2 \);  
   b) \( g(x) = x_i^2; f(y) = y_i \);  
   c) \( g(x_i) > g(x_j) \) for all \( x_i > x_j; f(y_i) = y_i \);

   Since every function \( g(x_i), f(y_i) \) are increasing function, then \( \tau(g(X_i), f(Y_i)) = \tau(X_i, Y_i) \).

3. Navidi, 7.1, #3.

   **Sln:**
   a) Kendall’s correlation is appropriate, because points are clusters on the line.
   b) Kendall’s correlation is inappropriate, because data is not monotonic.
   c) Kendall’s correlation is appropriate, because \( \tau \) is insensitive to outliers.

Sln:
\begin{itemize}
\item[a)] If the Kendall coefficient is positive, then above-average values of one variable are associated with above-average values of the other. TRUE
\item[b)] If the Kendall coefficient is negative, then below-average values of one variable are associated with below-average values of the other. FALSE
\item[c)] If \( y \) is usually less than \( x \), then the Kendall correlation between \( y \) and \( x \) will be negative. TRUE
\end{itemize}

5. Navidi, 7.1, #4. Sln:

\begin{tabular}{|c|c|c|c|c|}
\hline
Velocity & 1.54 & 1.60 & 0.95 & 1.30 & 2.92 \\
\hline
Acceleration & 7.64 & 8.04 & 8.04 & 6.37 & 5.00 \\
\hline
\end{tabular}

\begin{itemize}
\item[a)] Compute the Kendall correlation coefficient between peak velocity and peak acceleration. \( n = 5 \),
\begin{align*}
C &= 3: \{(1.54, 7.64), (1.60, 8.04)\}, \{(1.54, 7.64), (1.30, 6.37)\}, \\
&& \{(1.60, 8.04), (1.30, 6.37)\}; \\
D &= 6: \{(1.54, 7.64), (0.95, 8.04)\}, \{(1.54, 7.64), (2.92, 5.00)\}, \\
&& \{(1.60, 8.04), (2.92, 5.00)\}, \{(0.95, 8.04), (1.30, 6.37)\}, \\
&& \{(0.95, 8.04), (2.92, 5.00)\}, \{(1.30, 6.37), (2.92, 5.00)\}
\end{align*}
\end{itemize}

Therefore, \( \tau = \frac{2(C - D)}{n(n-1)} = \frac{2(3 - 6)}{5(5-1)} = -\frac{3}{10} \).
b) Construct a scatterplot for these data.

![Scatterplot of data](image)

c) Is the Kendall correlation coefficient an appropriate summary for these data? Explain why or why not.

Kendall coefficient is appropriate here, because data is negatively associated, and we have negative \( \tau \).

d) Someone suggests converting the units from meters to centimeters and from seconds to minutes. What effect would this have on the correlation?

Transformations are linearly increasing function, there is no effect on \( \tau \).