9. [14 points]
   a. [8 points] Consider functions \( f \) satisfying all of the following conditions:
      • \( f(x) \) is differentiable on the interval \( 0 < x < 8 \).
      • The critical points of \( f(x) \) in the interval \( 0 < x < 8 \) are \( x = 2, 4, \) and \( 6 \). (\( f(x) \) has no other critical points in this interval.)
      • The table below shows some values of \( f(x) \) and of its derivative \( f'(x) \).

\[
\begin{array}{c|c|c|c|c}
  x & 1 & 3 & 5 & 7 \\
  f(x) & 3 & 6 & 11 & 0 \\
  f'(x) & -1 & ? & ? & -1 \\
\end{array}
\]

For each of the statements below, decide whether the statement is true for all functions \( f \) satisfying all of the conditions described above, for some of these functions \( f \), or for none of these functions \( f \). Circle the one correct choice for each statement.
(i) \( f(x) \) has a local minimum at \( x = 2 \).
   \[ \text{ALL} \quad \text{SOME} \quad \text{NONE} \]
(ii) \( f'(3) > 0 \).
   \[ \text{ALL} \quad \text{SOME} \quad \text{NONE} \]
(iii) \( f(x) \) has a local maximum at \( x = 4 \).
   \[ \text{ALL} \quad \text{SOME} \quad \text{NONE} \]
(iv) There is exactly one value of \( a \) with \( 3 < a < 7 \) such that \( f(x) \) has a local maximum at \( x = a \).
   \[ \text{ALL} \quad \text{SOME} \quad \text{NONE} \]

b. [6 points] Consider functions \( g \) satisfying all of the following conditions:
   • \( g(z) \) and \( g'(z) \) are differentiable on the interval \( 12 < z < 18 \).
   • The critical points of \( g(z) \) in the interval \( 12 < z < 18 \) are \( z = 14 \) and \( z = 16 \). (\( g(z) \) has no other critical points in this interval.)
   • The table below shows some values of \( g(z) \) and of its second derivative \( g''(z) \).

\[
\begin{array}{c|c|c|c|c|c}
  z & 13 & 14 & 15 & 16 & 17 \\
  g(z) & 8 & ? & 6 & ? & 2 \\
  g''(z) & ? & -1 & ? & 0 & ? \\
\end{array}
\]

For each of the statements below, decide whether the statement is true for all functions \( g \) satisfying all of the conditions described above, for some of these functions \( g \), or for none of these functions \( g \). Circle the one correct choice for each statement.
(i) \( g(z) \) has a local extremum at \( z = 14 \).
   \[ \text{ALL} \quad \text{SOME} \quad \text{NONE} \]
(ii) \( g'(15) > 0 \).
   \[ \text{ALL} \quad \text{SOME} \quad \text{NONE} \]
(iii) \( g(z) \) has an inflection point at \( z = 16 \).
   \[ \text{ALL} \quad \text{SOME} \quad \text{NONE} \]