5. [15 points]
Shown on the right is the graph of \( h'(x) \), the derivative of a function \( h(x) \). Assume that \( h \) is continuous on its entire domain \((-\infty, \infty)\).

Use this graph to answer the questions below.

You may also use the fact that \( h(-4) = 5 \).

\[ \begin{array}{c}
-4 & -3 & -2 & -1 & 1 & 2 & 3 & 4 \\
\hline
y & 2 & 1 & 1 & 2 & 3 & 2 & 1
\end{array} \]

a. [3 points] Find the linear approximation \( L(x) \) of \( h(x) \) near \( x = -4 \), and use your formula to approximate \( h(-3.9) \).

**Answer:** \( L(x) = \) \[ \text{ and } \] \( h(-3.9) \approx \) \[ \text{ } \]

b. [2 points] Is the estimate of \( h(-3.9) \) in part a. an overestimate or underestimate of the actual value, or is there not enough information to decide? Briefly explain your reasoning.

*Circle one:* OVERESTIMATE UNDERESTIMATE NOT ENOUGH INFORMATION

**Brief explanation:**

For each question below, circle **all** correct choices. You do not need to justify your answers.

For each question below, circle **all** correct choices. You do not need to justify your answers.

c. [2 points] At which of the following values of \( x \) does \( h(x) \) have a critical point?

\[ x = -2 \quad x = -1 \quad x = 0 \quad x = 2 \quad x = 3 \quad \text{NONE OF THESE} \]

d. [2 points] At which of the following values of \( x \) does \( h(x) \) have a local maximum?

\[ x = -1 \quad x = 0 \quad x = 1 \quad x = 2 \quad x = 3 \quad \text{NONE OF THESE} \]

e. [2 points] At which of the following values of \( x \) does \( h(x) \) have an inflection point?

\[ x = -3 \quad x = -2 \quad x = -1 \quad x = 0 \quad x = 2 \quad \text{NONE OF THESE} \]

f. [2 points] If \( g(x) = h'(x) \), on which of the following interval(s) does \( g(x) \) satisfy the hypotheses of the Mean Value Theorem?

\[ [-4, -1] \quad [-1, 2] \quad [1, 3] \quad [2, 4] \quad \text{NONE OF THESE} \]

g. [2 points] If \( g(x) = h'(x) \), on which of the following interval(s) does \( g(x) \) satisfy the conclusion of the Mean Value Theorem?

\[ [-4, -1] \quad [-1, 2] \quad [1, 3] \quad [2, 4] \quad \text{NONE OF THESE} \]