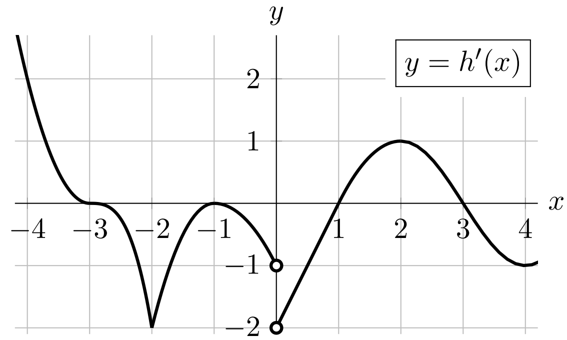
5. [15 points]
Shown on the right is the graph of $h'(x)$, the **derivative** of a function $h(x)$. Assume that h is continuous on its entire domain $(-\infty, \infty)$.

Use this graph to answer the questions below.

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



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: $L(x) =$ ________________ and $h(-3.9) \approx$ ________________

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.

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

$x = -2$ $x = -1$ $x = 0$ $x = 2$ $x = 3$ NONE OF THESE

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

$x = -1$ $x = 0$ $x = 1$ $x = 2$ $x = 3$ NONE OF THESE

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

$x = -3$ $x = -2$ $x = -1$ $x = 0$ $x = 2$ 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?

$[-4, -1]$ $[-1, 2]$ $[1, 3]$ $[2, 4]$ 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?

$[-4, -1]$ $[-1, 2]$ $[1, 3]$ $[2, 4]$ NONE OF THESE