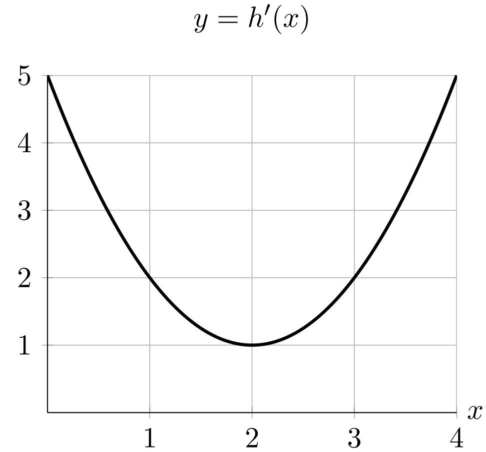
9. [7 points] The graph of $h'(x)$ (the **derivative** of $h(x)$) is shown below.



a. [3 points] Find a formula for the tangent line approximation $L(x)$ to the function $h(x)$ near $x = 2$ if the point $(2, -3)$ lies on the graph of $y = h(x)$. Your answer should not include the letter h.

Solution: $h(2) = -3$ and $h'(2) = 1$.

Answer: $L(x) = -3 + (x - 2)$

b. [1 point] Use the tangent line approximation to the function $h(x)$ near $x = 2$ to approximate the value of $h(1.6)$.

Solution:

Answer: $h(1.6)$ is approximately $L(1.6) = -3 + (1.6 - 2) = -3.4$.

c. [3 points] Is your approximation in part **b** an overestimate or an underestimate? Circle your answer and give a justification of your answer.

Solution:

$\boxed{\text{OVERESTIMATE}}$ UNDERESTIMATE NOT ENOUGH INFORMATION

Justification:

Since $h'(x)$ is decreasing on $[1.6, 2]$, $h(x)$ is concave down on $[1.6, 2]$. Hence the approximation is an overestimate.