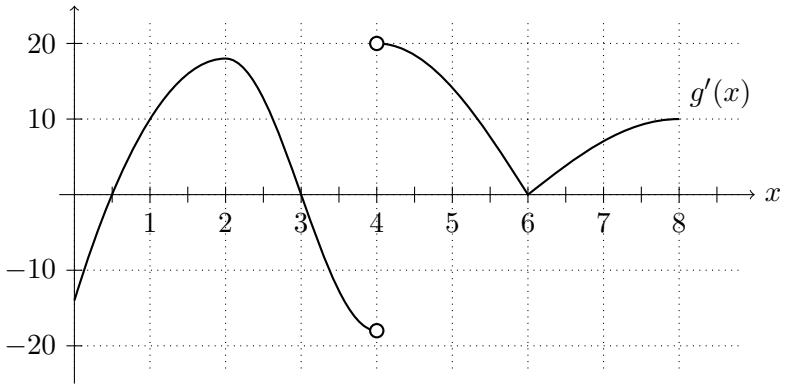
4. [17 points] The function $g(x)$ is continuous on the interval $0 < x < 8$. The graph of $g'(x)$, the **derivative** of $g(x)$, is shown below.



a. [6 points] List the x-coordinates of the critical points of the function $g(x)$ and state whether each is a local maximum, local minimum, or neither. You do not need to justify your answers.

Solution:

$x = 0.5$	$x = 3$	$x = 4$	$x = 6$
local minimum	local maximum	local minimum	neither

b. [3 points] List the x-coordinates of the inflection points of the function $g(x)$. You do not need to justify your answers.

Solution: $x = 2$, $x = 6$

c. [3 points] Suppose that $g(1) = 8$. Write an equation for the best linear approximation to $g(x)$ at $x = 1$.

$$g(x) \approx \underline{\qquad 10(x-1)+8 \qquad}$$

d. [2 points] Use your approximation from part **(c)** to estimate $g(1.05)$.

Solution: $g(1.05) \approx 10(1.05 - 1) + 8 = 8.5$

e. [3 points] Is your estimate for $g(1.05)$ an overestimate or an underestimate? Explain.

Solution: We see from the graph that $g'(x)$ is increasing at $x = 1$, so $g(x)$ is concave up at $x = 1$. Because the graph of $g(x)$ is concave up at $x = 1$, the tangent line is below the curve so our estimate is an underestimate.