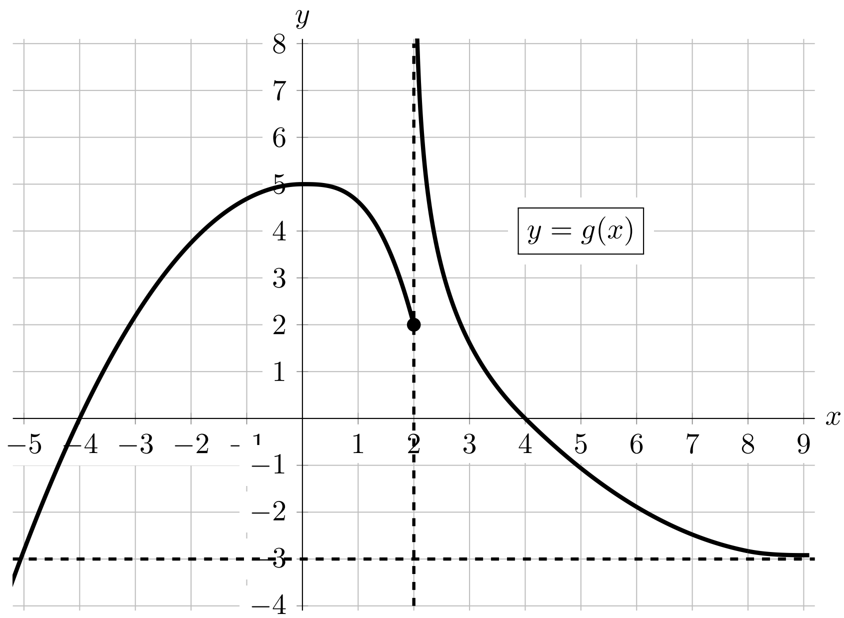
10. [9 points] A portion of the graph of a function $g(x)$ is shown below.



The function g has the following characteristics.

- A vertical asymptote at $x = 2$ (and no others).
- A horizontal asymptote at $y = -3$ (and no others).
- $g(x)$ is continuous and increasing on the interval $(-\infty, 0)$.
- $g(x)$ is continuous and decreasing on the interval $(2, \infty)$.
- The tangent line to the graph of $g(x)$ at $x = 0$ is horizontal.

a. [5 points] Consider $g'(x)$, the derivative of $g(x)$.
Determine whether each statement below is TRUE or FALSE. Write out the entire word TRUE or FALSE as your answer. No explanation is required.

i. $g'(-4) = 0$ FALSE

ii. $g'(0) = 0$ TRUE

iii. $g'(3) < g'(6)$ TRUE

iv. $g'(-4) = g'(4)$ FALSE

v. $g'(x)$ is decreasing on the interval $(-2, 1)$ TRUE

Solution: Remember, $g'(a)$ is the slope of the tangent line to the graph of $g(x)$ at $x = a$.

b. [4 points] Consider the function $h(x) = 3g(x + 2)$.
Determine whether each statement below is TRUE or FALSE. Write out the entire word TRUE or FALSE as your answer. No explanation is required.

i. $h(x)$ is defined for all real numbers. TRUE

ii. The line $y = -1$ is a horizontal asymptote of the graph of $y = h(x)$. FALSE

iii. The line $x = 4$ is a vertical asymptote of the graph of $y = h(x)$. FALSE

iv. $h(x)$ is not continuous at $x = 0$. TRUE

Solution: Note that the graph of $h(x)$ is obtained from the graph of $g(x)$ by first shifting the graph to the left by 2 units and then scaling (stretching) it vertically by a factor of 3.