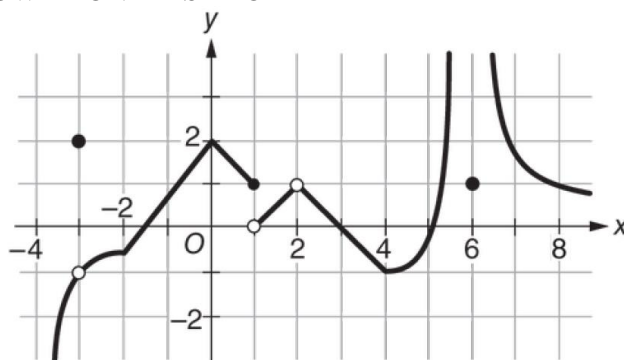


Complete all work in your notebook.

A CALCULATOR IS NOT ALLOWED ON THIS PROBLEM



Graph of f

x	-0.2	-0.1	-0.01	-0.001	0.001	0.01	0.1	0.2
$g(x)$	1.975	1.988	1.997	1.999	2.001	2.003	2.012	2.025

1. The graph of the function f is shown in the xy -plane above. f has a discontinuity due to a vertical asymptote at $x = 6$. Let g be a function that is continuous and increasing for all x . Values of $g(x)$ at selected values of x are shown in the table above.

- (a) Use the graph of f and the table of g , estimate $\lim_{x \rightarrow 0} (3f(x) - g(x))$.
- (b) For each of the values $a = 1$, $a = 2$, $a = 4$, and $a = 6$, find $\lim_{x \rightarrow a} f(x)$ or explain why $\lim_{x \rightarrow a} f(x)$ does not exist. Use correct limit notation in your answers.
- (c) Is f continuous at $x = -3$? Using correct notation, justify your answer.
- (d) Write a difference quotient that best approximates the instantaneous rate of change of g at $x = 0$.

x	$f(x)$	$f'(x)$
3	-1	8
5	4	3
7	6	-2

2. The table above gives values of the differentiable function f and its derivative f' at selected values of x . Let h be the function defined by $h(x) = \sqrt{x^2 + 4x - 5}$.

- (a) Using values of f from the table, estimate $f'(4)$. Show the work that leads to your answer.
- (b) Let M be the function defined by $M(x) = f(x) + h(x)$. Find $M'(3)$.
- (c) Let N be the function defined by $N(x) = f(x)h(x)$. Find $N'(5)$.
- (d) Let P be the function defined by $P(x) = \frac{h(x)}{f(x)}$. Find $P'(7)$.