1.1 Domain

ex. Use interval notation to state the domain.

$\frac{A}{B}$ requires $B \neq 0$

$\sqrt{A}$ requires $A \geq 0$

(a) $f(x) = \sqrt{x+2}$

(b) $g(x) = \frac{1}{x^2 - 5x}$

(c) $h(x) = \frac{\sqrt{x+2}}{x^2 - 5x}$

1.2 Composition

ex. $f(x) = x^2 - \frac{1}{x}$ $\quad g(x) = 8 - 5x$

$f \circ g(x) = f(g(x))$

$g \circ f(x) = g(f(x))$

etc.

(a) Find $f \circ g(x)$

(b) Find $g \circ f(x)$

(c) Find $g \circ g(x)$

1.5 Exponential Models

ex. Suppose f is exponential, $f(x) = ca^x$. If $f(20) = 24$ and $f(30) = 144$, find $f(x)$.

1.6 Logarithms

ex.

(a) What is $\log_3\left(\frac{1}{9}\right)$?

(b) Solve: $\log_3(x^2 + 6x) = 3$

$\log_a w = z \iff a^z = w$

2.1 Average Rate of Change

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

3. Revenue Let $R(t)$ be the monthly revenue (in thousands of dollars) of a restaurant t months after the restaurant opened. If $R(6) = 154.2$ and $R(9) = 179.7$, compute the average rate of change for $6 \leq t \leq 9$. What does your result mean in this context?

Result mean in this context?

2.2 DEFINITIONS: LIMIT (+ONE-SIDED), CONTINUOUS AT a

The graph of f is given.

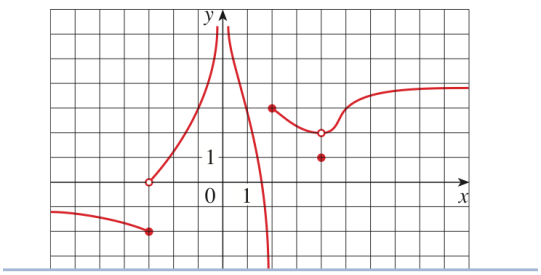
(a) Find each limit, or explain why it does not exist.

(i) $\lim_{x \to 2^+} f(x)$ **(ii)** $\lim_{x \to -3^+} f(x)$

(iii) $\lim_{x \to -3} f(x)$ **(iv)** $\lim_{x \to 4} f(x)$

(v) $\lim_{x \to 0} f(x)$

(b) At what numbers is f not continuous? Explain.



2.2 LIMITS

7–14 ■ Evaluate the limit.

7. $\lim_{x \to 1} (5x^2 - 4x + 5)$

8. $\lim_{x \to 3} \dfrac{x^2 - 9}{x^2 + 2x - 3}$

9. $\lim_{x \to -3} \dfrac{x^2 - 9}{x^2 + 2x - 3}$

10. $\lim_{t \to 2} \dfrac{t^2 - 4}{t^2 + 3t - 10}$

11. $\lim_{t \to 0} 4e^{-2t}$

12. $\lim_{b \to 1} (\ln b)^2$

2.3 DEF: DERIVATIVE AT A POINT $f'(a) = \lim_{x \to a} \dfrac{f(x) - f(a)}{x - a} = \lim_{h \to 0} \dfrac{f(a+h) - f(a)}{h}$

ex. SETUP A LIMIT FOR $f'(3)$ WHEN $f(x) = \ln(x+1)$. DO NOT EVALUATE.

ex. GIVE EQUATION OF TANGENT LINE TO $y = \dfrac{3}{x+4}$ AT $(-5, -3)$

2.4 THE DERIVATIVE OF A FUNCTION AND NOTATION

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

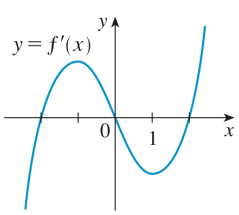
ex. FIND $f'(x)$ WHEN $f(x) = \sqrt{2x+1}$

45. The graph of the *derivative* f' of a function f is given.

(a) On what intervals is f increasing or decreasing?

(b) At what values of x does f have a local maximum or minimum?

(c) Where is f concave upward or downward?



46. The figure shows the graphs of f, f', and f''. Identify each curve, and explain your choices.