

Cumulative Review E

Find the indicated limit.

$$1) \lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^3 - 8}$$

$$2) \lim_{x \rightarrow -\infty} \frac{x^2 - 4x + 1}{3x - 5}$$

$$3) \lim_{x \rightarrow 1} \frac{\frac{1}{x+2} - \frac{1}{3}}{x-1}$$

$$4) \lim_{x \rightarrow 5} \frac{x-5}{3 - \sqrt{2x-1}}$$

$$5) \text{ Given } f(x) = \begin{cases} x^2 - 3, & x < 2 \\ -x^3 + 9, & x \geq 2 \end{cases}$$

$$6) \text{ Given } f(x) = \begin{cases} 2x + 1, & x < 1 \\ x - 3, & x \geq 1 \end{cases}$$

a. $\lim_{x \rightarrow 2^-} f(x) =$

a. $\lim_{x \rightarrow 1^-} f(x) =$

b. $\lim_{x \rightarrow 2^+} f(x) =$

b. $\lim_{x \rightarrow 1^+} f(x) =$

c. $\lim_{x \rightarrow 2} f(x) =$

c. $\lim_{x \rightarrow 1} f(x) =$

d. $f(2) =$

d. $f(1) =$

e. Is $f(x)$ continuous at $x = 2$? Why or why not

e. Is $f(x)$ continuous at $x = 1$? Why or why not

Differentiate.

7) $f(x) = -3 \tan^2 x$

8) $y = \ln(\cos x)$

9) $g(x) = \sqrt[3]{x^2 + 5}$

10) $y = \frac{x^2 + 3x}{2x - 3}$

Find an equation of the tangent line.

11) $x^2 + 5xy - 3y^2 = -1$ at $(1, 2)$

12) $x^3 - y^3 = 9$ at $(2, -1)$

Find the higher derivatives.

13) Find $\frac{d^2y}{dx^2}$ for $y = -\tan x$

14) Find $\frac{d^2y}{dx^2}$ for $y = \sqrt{2x - 3}$