

# Section 2-3

a.  $\lim_{x \rightarrow 2} f(x) + \lim_{x \rightarrow 2} g(x) = 1 + 0 = 1$

b. DNE because  $\lim_{x \rightarrow 1} (x)$  does not exist

c.  $\lim_{x \rightarrow 0} f(x) \cdot \lim_{x \rightarrow 0} g(x) = 0 \times 1.3 = 0$

d. DNE because  $\lim_{x \rightarrow -1} g(x) = 0$

e.  $x^3 \cdot \lim_{x \rightarrow 2} f(x) = 2^3 \cdot 2 = 16$

f.  $\lim_{x \rightarrow 3} \sqrt{3+f(x)} = \sqrt{4} = 2$

11.  $\lim_{x \rightarrow 5} x - 1 = 4$       12. DNE

13.  $\lim_{t \rightarrow -3} \frac{(t+3)(t-3)}{(2t+1)(t+3)} = \lim_{t \rightarrow -3} \frac{t-3}{2t+1} = \frac{-3-3}{-6+1} = \frac{-6}{-5} = \frac{6}{5}$

14.  $\frac{(x)(x-4)}{(x+1)(x-4)} = \lim_{x \rightarrow 1} \frac{x}{x+1} = \frac{-1}{0} = \text{DNE}$

15.  $\frac{(2x+1)(x+1)}{(x-2)(x+1)} = \lim_{x \rightarrow -1} \frac{2x+1}{x-2} = \frac{-2+1}{-1-2} = \frac{-1}{-3} = \frac{1}{3}$

17.  $\frac{h^2 - 10h + 25}{h} = \frac{h^2 - 10h}{h} = \lim_{h \rightarrow 0} h - 10 = -10$

18.  $\lim_{x \rightarrow 0} \frac{x^3 + 6x^2 + 12x + 8 - 8}{x} = \lim_{x \rightarrow 0} x^2 + 6x + 12 = \lim_{x \rightarrow 0} x^2 + \lim_{x \rightarrow 0} 6x + 12 = 0 + 0 + 12 = 12$

$x^2$	4	$x$
$x^3$	4	$x$
$2x^2$	8	$2$

$x^2$	4
$x^3$	4
$2x^2$	8



$$19. \lim_{x \rightarrow -2} \frac{x+2}{(x+2)(x^2-2x+4)} = \frac{1}{\lim_{x \rightarrow -2} x^2 - 2 \lim_{x \rightarrow -2} x + 4}$$

$$= \frac{1}{4 + 4 + 4} = \frac{1}{12}$$

$$20. \lim_{x \rightarrow 1} \frac{(x^2+1)(x+1)(x-1)}{(x-1) \cdot (x^2+x+1)} = \frac{(x^2+1)(x+1)}{x^2+x+1}$$

$$21. \frac{\sqrt{h+9} - 3}{h} \cdot \frac{\sqrt{h+9} + 3}{\sqrt{h+9} + 3} = \frac{h+9-9}{h(\sqrt{h+9})} = \frac{h}{h(\sqrt{h+9})}$$

$$\lim_{h \rightarrow 0} \frac{1}{\sqrt{h+9}} = \frac{1}{3} = \boxed{\frac{1}{3}}$$

$$\lim_{h \rightarrow 0} \frac{1}{\sqrt{h+9}} = \frac{1}{3} = \boxed{\frac{1}{3}}$$

$$22. \frac{\sqrt{4v+1} - 3}{v-2} \cdot \frac{\sqrt{4v+1} + 3}{\sqrt{4v+1} + 3} = \frac{4v+1-9}{(v-2)(\sqrt{4v+1}+3)} = \frac{4v-8}{(v-2)(\sqrt{4v+1}+3)}$$

$$23. \frac{1}{4} + \frac{1}{4} \cdot \left( \frac{1}{x+4} \right) = \frac{1}{4x+16} + \frac{1}{x^2+4x} = \frac{1}{4} + \frac{1}{0} = \text{DNE}$$

$$24. \lim_{x \rightarrow -1} \frac{(x+1)(x+1)}{(x^2+1)(x+1)(x+1)} = \frac{x+1}{(x^2+1)(x+1)} = \frac{0}{4} = 0$$

# Section 2-6

3-8, 15-30, 36

3. a.  $\lim_{x \rightarrow \infty} f(x) = -2$       b.  $\lim_{x \rightarrow -\infty} f(x) = 2$

c. DNE

d. DNE

e.  $x = 2, -2$   
 $y = 1, 3$

4. a. 2

b. -1

c. DNE

d. DNE

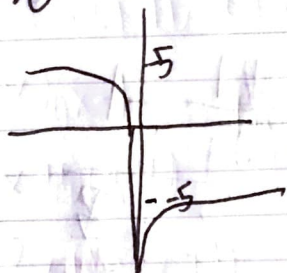
e. DNE

f.  $x = -1, 2$   
 $y = 2$

5.  $\lim_{x \rightarrow 0} = -\infty$

$\lim_{x \rightarrow -\infty} = 5$

$\lim_{x \rightarrow \infty} = -5$



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

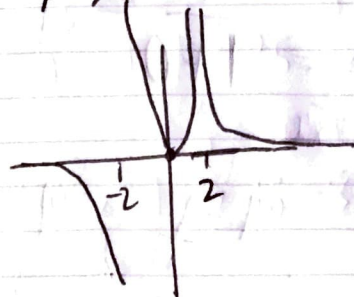
$x \rightarrow 2^+ = \infty$

$x \rightarrow -\infty$

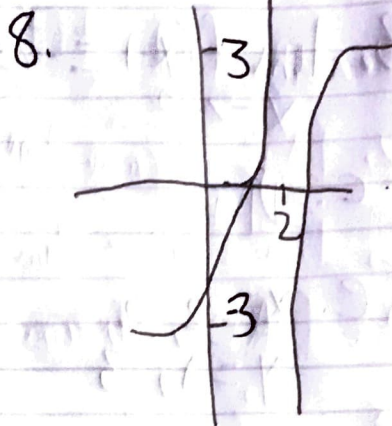
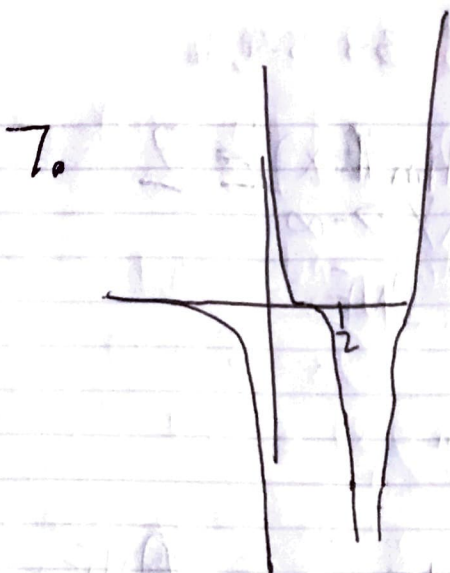
$f(0) = 0$

$x \rightarrow 2^- = -\infty$

$x \rightarrow \infty$







15.  $\lim_{x \rightarrow \infty} \frac{3x-2}{2x+1}$ , take leading term  $\rightarrow \lim_{x \rightarrow \infty} \frac{3}{2} = \frac{3}{2}$

16.  $\lim_{x \rightarrow \infty} \frac{x^2}{x^3} = \lim_{x \rightarrow \infty} \frac{1}{x} = 0$

17. 0

18.  $-\infty$

19. ~~1~~ -1

20.  $\frac{1 - \sqrt{5}}{2 + \sqrt{5} + 3 + -5} = \frac{1 - \sqrt{5}}{\sqrt{5} - 1} = \frac{1 - \sqrt{5}}{\sqrt{5} - 1} \cdot \frac{\sqrt{5} + 1}{\sqrt{5} + 1} = \frac{1 - 5}{5 - 1} = \frac{-4}{4} = -1$

21. how to solve?

22.  $\frac{x^2}{\sqrt{x^4+1}} = \frac{x^2}{x^2 \sqrt{1+\frac{1}{x^4}}} = \frac{1}{1+0} = 1$

23.  $\frac{\sqrt[3]{x^6-x}}{x^3+1} = \frac{\sqrt[3]{x^6-x}}{x^3+1} = \frac{1 - \frac{1}{x^6}}{1 + \frac{1}{x^3}} = \frac{1-0}{1+0} = 1$

24. Same as #23, a I think?

25. 
$$\sqrt{\frac{9x^2 + x}{9x^2} - \frac{3x}{3x}} = \sqrt{1+0} - 1 = 0$$

$$\sqrt{1 + \frac{1}{9x}} - 1$$

26. 
$$\sqrt{\frac{x^2 + 2x}{x^2} + \frac{x}{x}} = \sqrt{1 + \frac{2}{x}} + 1 = 2$$

27. 
$$\sqrt{\frac{x^2 + ax}{x^2}} - \sqrt{\frac{x^2 + bx}{x^2}} = \sqrt{1 + \frac{a}{x}} - \sqrt{1 + \frac{b}{x}} = 0$$

28. infinity

36 I don't know

29. infinity

30. DNE