1.5/3.5 Infinite Limits and Limits at Infinity

Pg. 88 #'s 5, 7, 29, 30, 33–39 odd, 53, 55, 60

Pg. 202 #'s 17–37 odd, 53, 54

5) $\lim_{x\to 4^-} \frac{1}{x-4} = \frac{1}{-\#} = -\infty$

$\lim_{x\to 4^+} \frac{1}{x-4} = \frac{1}{+\#} = \infty$

7) $\lim_{x\to 4^-} \frac{1}{(x-4)^2} = \frac{1}{(-\#)^2} = \infty$

$\lim_{x\to 4^+} \frac{1}{(x-4)^2} = \frac{1}{(+\#)^2} = \infty$

29) $f(x) = \frac{x^2-1}{x+1}$

$f(x) = \frac{(x+1)(x-1)}{(x+1)}$

$f(x) = x-1$

$f(x)$ has a removable discontinuity at $x=-1$

30) $f(x) = \frac{x^2-2x-8}{x+1}$

$f(x) = \frac{(x-4)(x+2)}{x+1}$

$f(x)$ has a vertical asymptote at $x=-1$

33) $\lim_{x\to -1^+} \frac{1}{x+1} = \frac{1}{+\#} = \infty$

35) $\lim_{x\to 2^+} \frac{x}{x-2} = \frac{2}{+\#} = \infty$

37) $\lim_{x\to -3^-} \frac{x+3}{x^2+x-6} = \frac{x+3}{(x+3)(x-2)} = \frac{1}{x-2} = -\frac{1}{5}$

39) $\lim_{x\to 0^-} \left(1+\frac{1}{x}\right) = 1+\frac{1}{-\#} = 1-\infty = -\infty$

53) An infinite limit is one that increases/decreases without bound as $x\to c$. ∞ is not a real number. ∞ is a set of real numbers.

55) $f(x) = \frac{x-3}{(x-6)(x+2)}$

60) $\lim_{v\to 0^+} P = \infty$

As the volume of the gas condenses toward 0, the resulting pressure of the gas skyrockets upward.

17) a) 0 19) 4 21) $2/3$ 23) 0

b) $-2/3$

c) $-\infty$

25) ∞, DNE 27) -1 29) -2 31) $1/2$

33) ∞, DNE 35) $\frac{1}{\infty} = 0$ 37) $\frac{\pm 1}{\infty} = 0$

53) $f(x)$ has a horizontal asymptote of $f(x) = 4$ as $x \to \infty$

54) $f(x)$ has a horizontal asymptote of $f(x) = 2$ as $x \to -\infty$