37. $f(x) = \frac{2}{x} - 3$

38. $f(x) = \pi - \frac{2}{x^2}$

39. $g(x) = \frac{1}{2 + (1/x)}$

40. $g(x) = \frac{1}{8 - (5/x^2)}$

41. $h(x) = \frac{-5 + (7/x)}{3 - (1/x^2)}$

42. $h(x) = \frac{3 - (2/x)}{4 + \left(\sqrt{2}/x^2\right)}$

43. $\lim_{x \to \infty} \frac{\sin 2x}{x}$

44. $\lim_{\theta \to -\infty} \frac{\cos \theta}{3\theta}$

45. $\lim_{t \to -\infty} \frac{2 - t + \sin t}{t + \cos t}$

46. $\lim_{r \to \infty} \frac{r + \sin r}{2r + 7 - 5 \sin r}$

The following limits as $x \to \infty$ and $x \to -\infty$

47. $f(x) = \frac{2x + 3}{5x + 7}$

48. $f(x) = \frac{2x^3 + 7}{x^3 - x^2 + x + 7}$

49. $f(x) = \frac{x + 1}{x^2 + 3}$

50. $f(x) = \frac{3x + 7}{x^2 - 2}$

51. $h(x) = \frac{7x^3}{x^3 - 3x^2 + 6x}$

52. $g(x) = \frac{1}{x^3 - 4x + 1}$

53. $g(x) = \frac{10x^5 + x^4 + 31}{x^6}$

54. $h(x) = \frac{9x^4 + x}{2x^4 + 5x^2 - x + 6}$

55. $h(x) = \frac{-2x^3 - 2x + 3}{3x^3 + 3x^2 - 5x}$

56. $h(x) = \frac{-x^4}{x^4 - 7x^3 + 7x^2 + 9}$

57. $\lim_{x\to\infty} \frac{2\sqrt{x} + x^{-1}}{3x - 7}$

58. $\lim_{x\to\infty} \frac{2 + \sqrt{x}}{2 - \sqrt{x}}$

59. $\lim_{x\to-\infty} \frac{\sqrt[3]{x} - \sqrt[5]{x}}{\sqrt[3]{x} + \sqrt[5]{x}}$

60. $\lim_{x\to\infty} \frac{x^{-1} + x^{-4}}{x^{-2} - x^{-3}}$

61. $\lim_{x\to\infty} \frac{2x^{5/3} - x^{1/3} + 7}{x^{8/5} + 3x + \sqrt{x}}$

62. $\lim_{x\to-\infty} \frac{\sqrt[3]{x} - 5x + 3}{2x + x^{2/3} - 4}$

Trigonometric Identities

1) $\csc x = \frac{1}{\sin x}$
2) $\sec x = \frac{1}{\cos x}$
3) $\cot x = \frac{1}{\tan x}$
4) $\sin^2 x + \cos^2 x = 1$
5) $\tan^2 x + 1 = \sec^2 x$
6) $1 + \cot^2 x = \csc^2 x$
7) $\sin(-x) = -\sin(x)$ that is $\sin(x)$ is odd
8) $\cos(-x) = \cos(x)$ that is $\cos(x)$ is even
9) $\tan(-x) = -\tan(x)$ that is $\tan(x)$ is odd
10) $\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y$
11) $\cos(x \pm y) = \cos x \cos y \mp \sin x \sin y$
12) $\tan(x \pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y}$
13) $\sin(2x) = 2\sin(x)\cos(x)$
14) $\cos(2x) = \cos^2 x - \sin^2 x = 1 - 2\sin^2(x)$
$= 2\cos^2(x) - 1$
15) $\tan 2x = \frac{2\tan x}{1 - \tan^2 x}$
16) $\sin^2 x = \frac{1 - \cos 2x}{2}$
17) $\cos^2 x = \frac{1 + \cos 2x}{2}$
18) $\tan^2 x = \frac{1 - \cos 2x}{1 + \cos 2x}$

EXERCISES 2.5 P. 122

1. $\lim_{x \to 0^+} \frac{1}{3x}$

2. $\lim_{x \to 0^-} \frac{5}{2x}$

3. $\lim_{x \to 2^-} \frac{3}{x - 2}$

4. $\lim_{x \to 3^+} \frac{1}{x - 3}$

5. $\lim_{x \to -8^+} \frac{2x}{x + 8}$

6. $\lim_{x \to -5^-} \frac{3x}{2x + 10}$

7. $\lim_{x \to 7} \frac{4}{(x - 7)^2}$

8. $\lim_{x \to 0} \frac{-1}{x^2(x + 1)}$

9. **a.** $\lim_{x \to 0^+} \frac{2}{3x^{1/3}}$

b. $\lim_{x \to 0^-} \frac{2}{3x^{1/3}}$

10. **a.** $\lim_{x \to 0^+} \frac{2}{x^{1/5}}$

b. $\lim_{x \to 0^-} \frac{2}{x^{1/5}}$

11. $\lim_{x \to 0} \frac{4}{x^{2/5}}$

12. $\lim_{x \to 0} \frac{1}{x^{2/3}}$

13. $\lim_{x \to (\pi/2)^-} \tan x$

14. $\lim_{x \to (-\pi/2)^+} \sec x$

15. $\lim_{\theta \to 0^-} (1 + \csc \theta)$

16. $\lim_{\theta \to 0} (2 - \cot \theta$