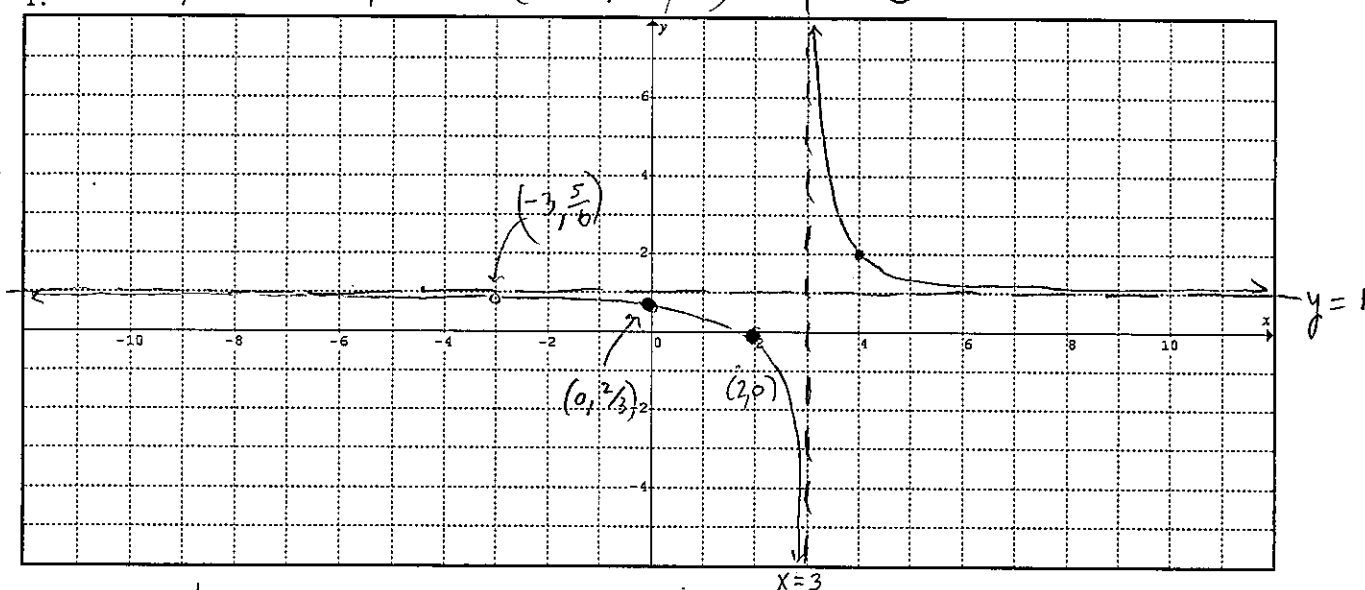


[Lesson 2 Solutions]

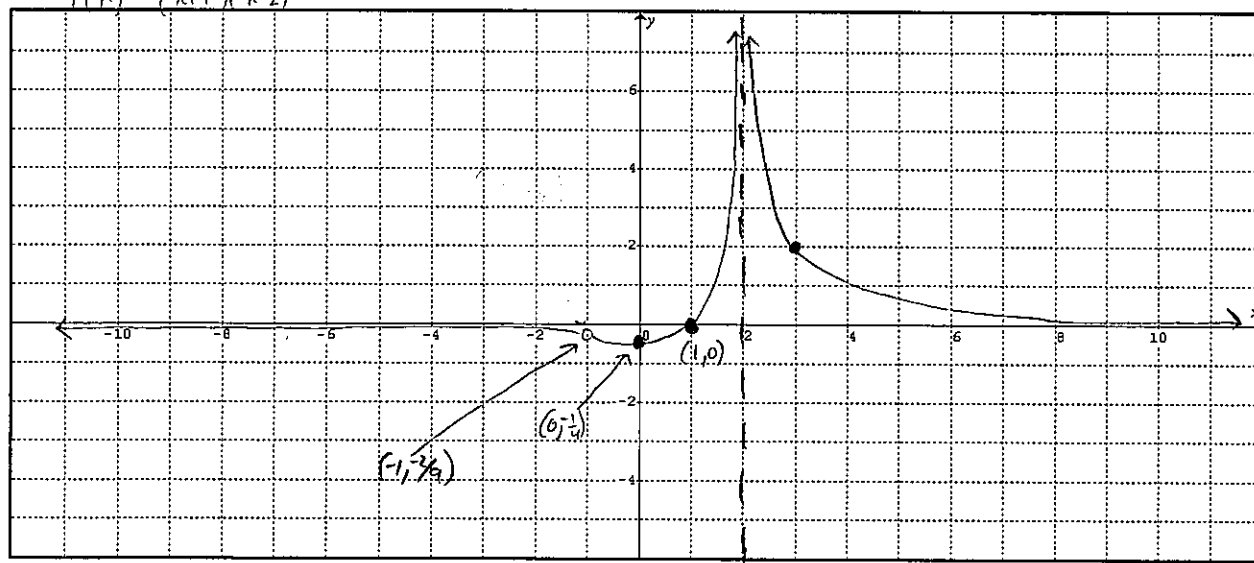
1. $f(x) = \frac{x^2 + x - 6}{x^2 - 9} = \frac{(x-2)(x+3)}{(x-3)(x+3)} = \frac{x-2}{x-3}$



□ HA: $\lim_{x \rightarrow \pm\infty} f(x) = 1$: $y=1 \rightarrow$ PURE $f(x) \neq 1$

□ VA: $\left. \begin{array}{l} \lim_{x \rightarrow 3^+} f(x) = +\infty \\ \lim_{x \rightarrow 3^-} f(x) = -\infty \end{array} \right\} x=3$

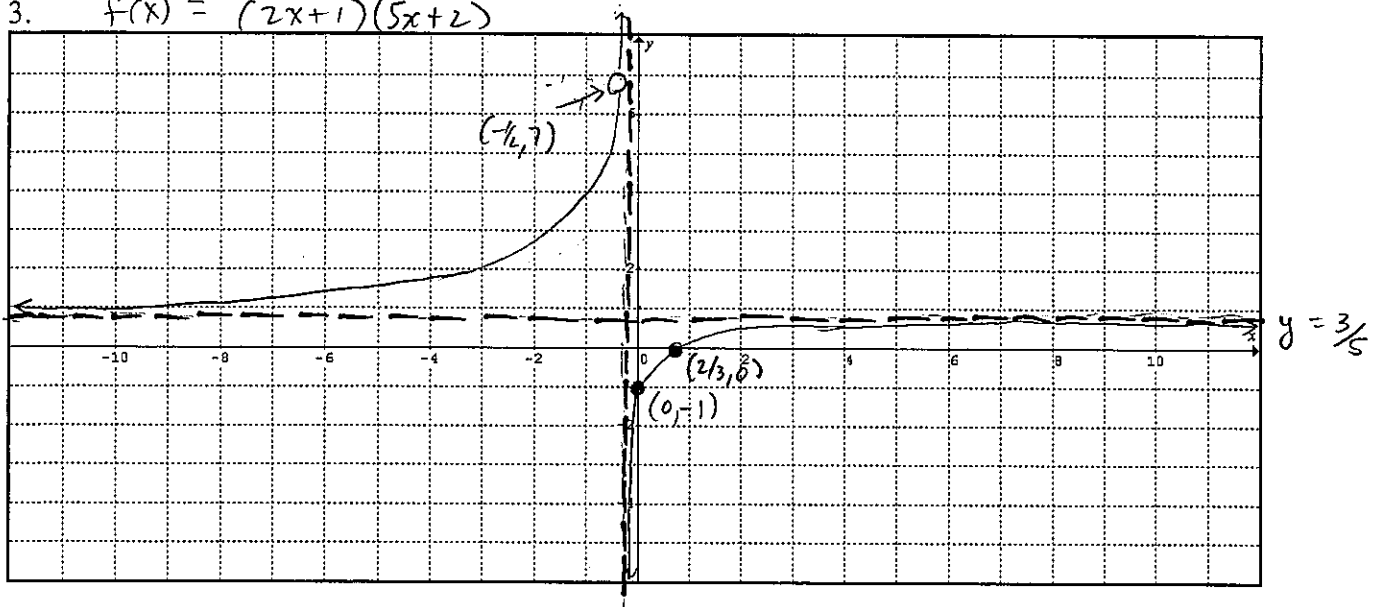
2. $f(x) = \frac{(x+1)(x-1)}{(x+1)(x-2)^2}$



□ HA: $\lim_{x \rightarrow \pm\infty} f(x) = 0$: $y=0 \rightarrow$ NOT PURE $f(x) = 0$ at $x=1$

□ VA: $\left. \begin{array}{l} \lim_{x \rightarrow 2^+} f(x) = +\infty \\ \lim_{x \rightarrow 2^-} f(x) = +\infty \end{array} \right\} x=2$

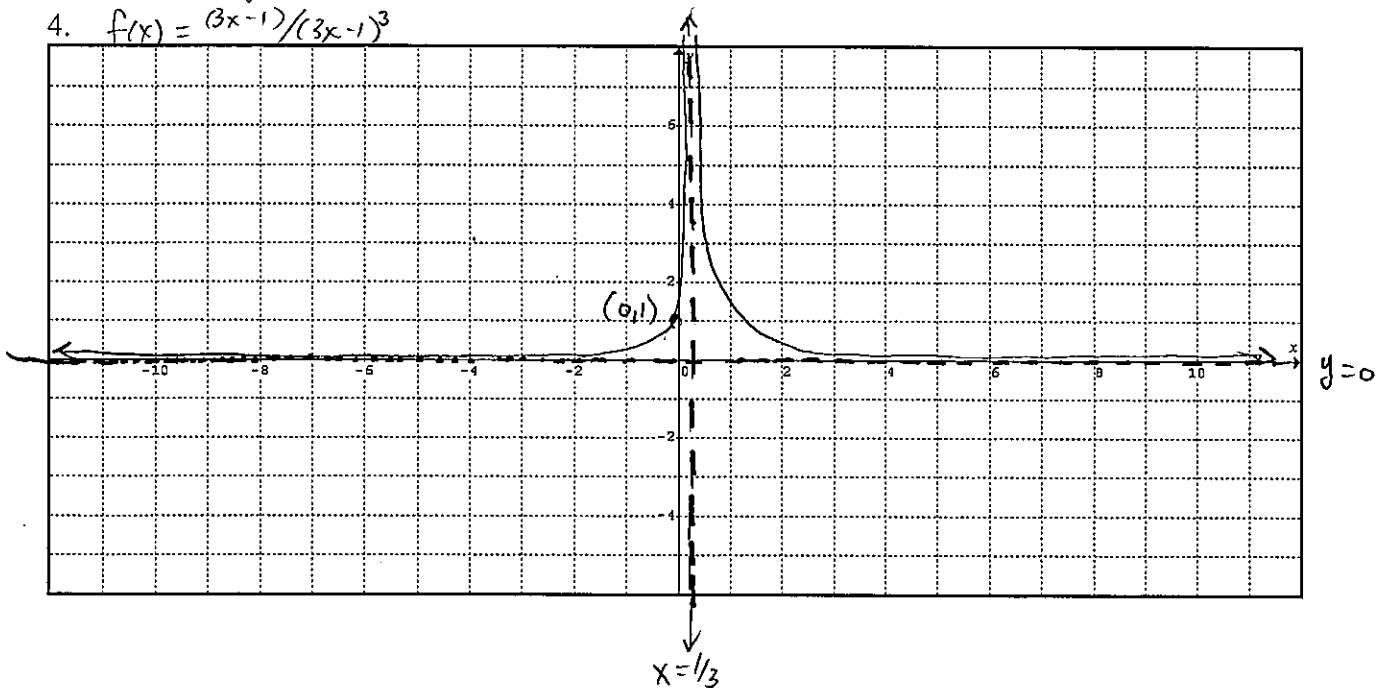
3. $f(x) = \frac{(2x+1)(3x-2)}{(2x+1)(5x+2)}$



□ HA: $\lim_{x \rightarrow \pm\infty} f(x) = \frac{3}{5} : y = 3/5 \rightarrow \text{punc } f(x) \neq \frac{3}{5}$

□ VA: $\left. \begin{array}{l} \lim_{x \rightarrow -2/5^+} f(x) = -\infty \\ \lim_{x \rightarrow -2/5^-} -f(x) = +\infty \end{array} \right\} x = -2/5$

4. $f(x) = (3x-1)/(3x-1)^3$



□ HA: $\lim_{x \rightarrow \pm\infty} f(x) = 0 : y = 0 \rightarrow \text{punc } f(x) \neq 0$

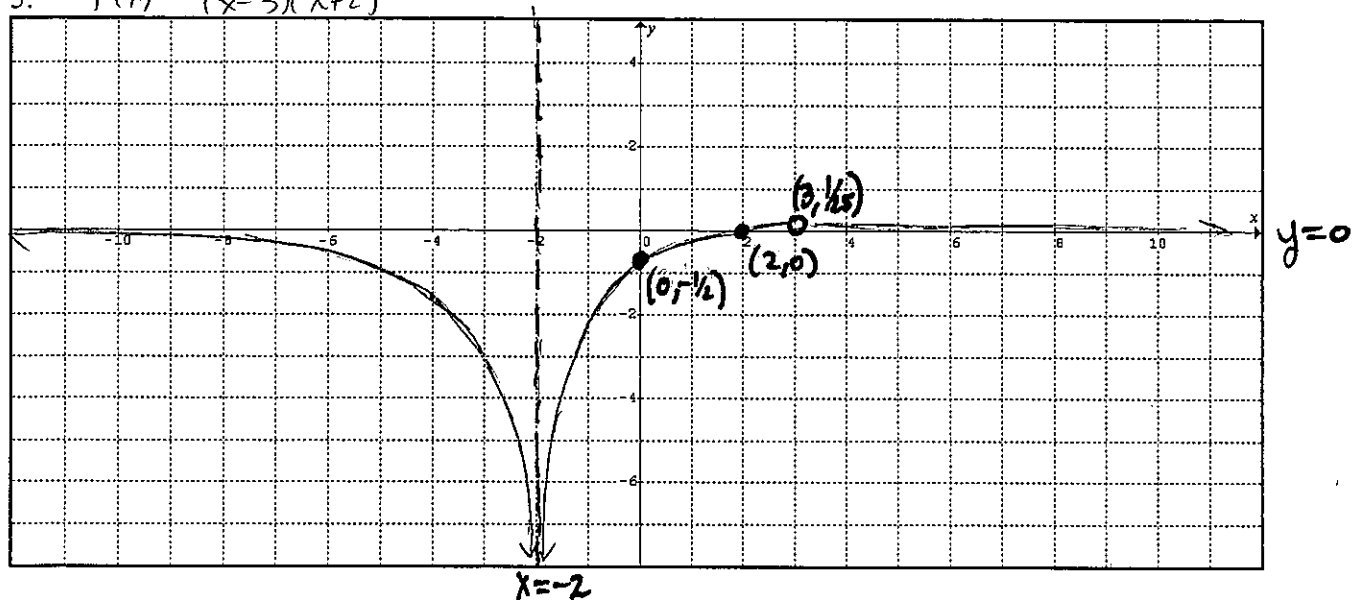
□ VA: $\left. \begin{array}{l} \lim_{x \rightarrow 1/3^+} f(x) = +\infty \\ \lim_{x \rightarrow 1/3^-} f(x) = +\infty \end{array} \right\} x = 1/3$

$$\frac{1}{2x}$$

$$\frac{-2}{4}$$

$$\frac{-6}{4}$$

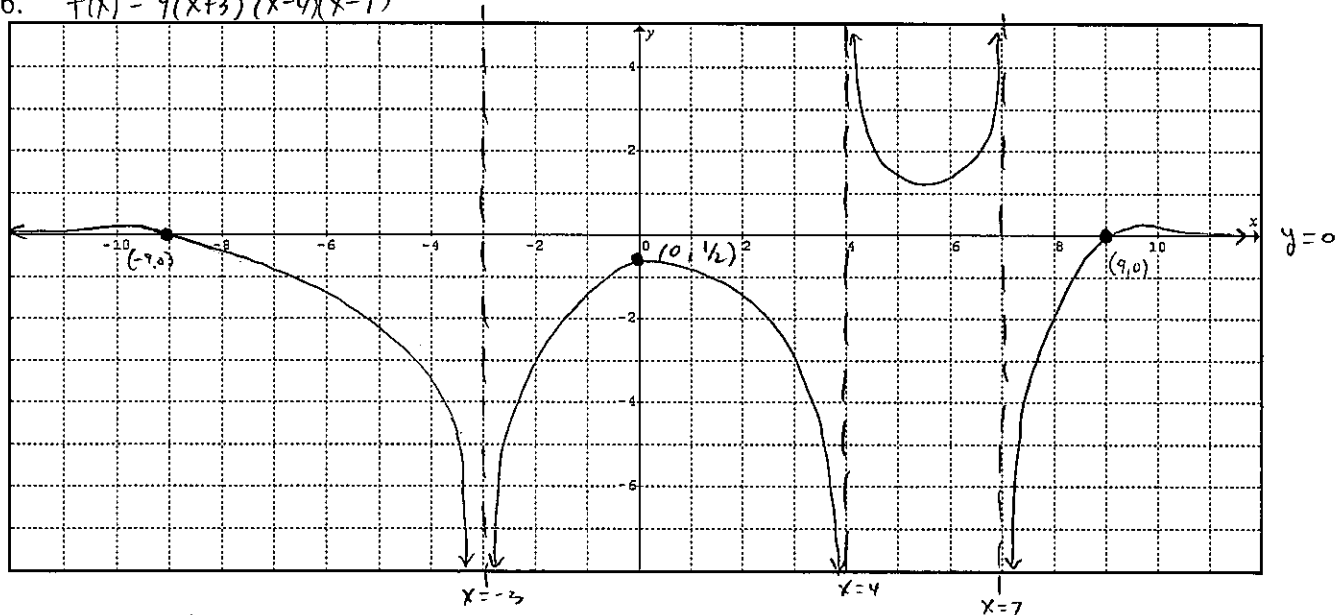
5. $f(x) = \frac{(x-3)(x-2)}{(x-3)(x+2)^2}$



□ HA: $\lim_{x \rightarrow \pm\infty} f(x) = 0 : y = 0 \rightarrow$ NOT PURE $f(x) = 0$ at $x = 2$

□ VA: $\left. \begin{array}{l} \lim_{x \rightarrow -2^+} f(x) = -\infty \\ \lim_{x \rightarrow -2^-} f(x) = -\infty \end{array} \right\} x = -2$

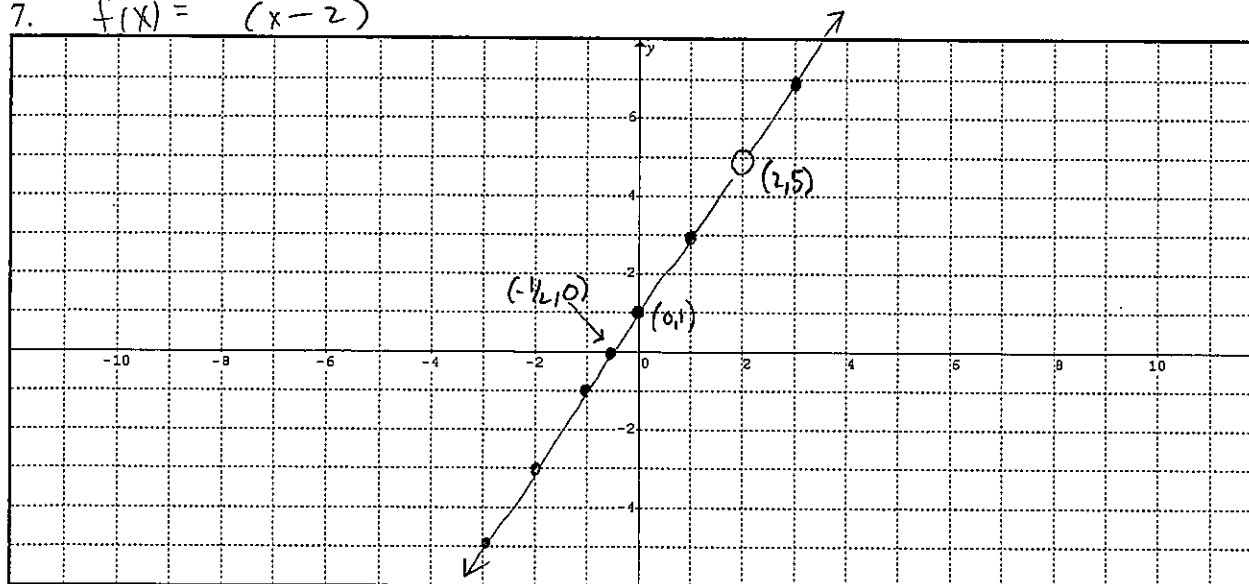
6. $f(x) = \frac{14(x^2-21)}{9(x+3)^2(x-4)(x-7)}$



□ HA: $\lim_{x \rightarrow \pm\infty} f(x) = 0 : y = 0 \rightarrow$ NOT PURE $f(x) = 0$ at $x = \pm 9$

□ VA: $\left. \begin{array}{l} \lim_{x \rightarrow -3^+} f(x) = -\infty \\ \lim_{x \rightarrow -3^-} f(x) = -\infty \end{array} \right\} x = -3$ $\left. \begin{array}{l} \lim_{x \rightarrow 4^+} f(x) = +\infty \\ \lim_{x \rightarrow 4^-} f(x) = -\infty \end{array} \right\} x = 4$ $\left. \begin{array}{l} \lim_{x \rightarrow 7^+} f(x) = -\infty \\ \lim_{x \rightarrow 7^-} f(x) = +\infty \end{array} \right\} x = 7$

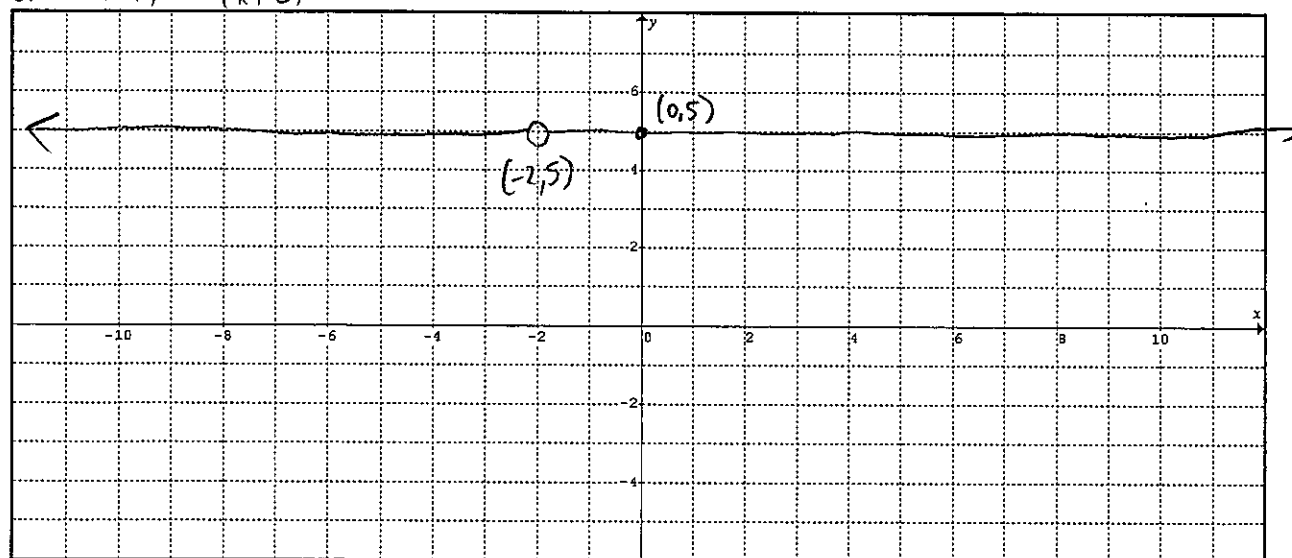
7. $f(x) = \frac{(2x+1)(x-2)}{(x-2)}$



HA: NONE

VA: NONE

8. $f(x) = \frac{5(x+2)^2}{(x+2)^2}$



HA: $\lim_{x \rightarrow \pm\infty} f(x) = 5$: $y = 5$ NOT PURE function is a symple.

VA: NONE

Mixed Review (Trigonometric Essentials)

Evaluate the following:

$$1. \sin\left(\frac{5\pi}{6}\right) = \frac{1}{2}$$

$$2. \cos\left(\frac{11\pi}{6}\right) = \frac{\sqrt{3}}{2}$$

$$3. \tan\left(\frac{4\pi}{3}\right) = \frac{-\sqrt{3}/2}{-1/2} = +\sqrt{3}$$

$$4. \sec\left(\frac{2\pi}{3}\right) = \frac{1}{-1/2} = -2$$

$$5. \csc\left(\frac{7\pi}{6}\right) = \frac{1}{-1/2} = -2$$

Solve each equation on the domain $[0, 2\pi]$ (answer in radians):

$$6. \sin(x) = \frac{1}{2}$$

$$x = \frac{\pi}{6}, \frac{5\pi}{6}$$

$$7. \tan(x) = -\frac{1}{\sqrt{3}}$$

$$x = \frac{5\pi}{6}, \frac{11\pi}{6}$$

$$8. \sin(x) + \cos(x) = 0$$

$$\sin x = -\cos x \rightarrow \tan x = -1$$

$$x = \frac{3\pi}{4}, \frac{7\pi}{4}$$

$$9. \cos^2(x) + \cos(x) = 0 \quad \cos x (\cos x + 1) = 0$$

$$\cos x = 0 \quad \text{or} \quad \cos x = -1$$

$$x = \frac{\pi}{2}, \frac{3\pi}{2} \quad x = \pi$$

$$x = \frac{\pi}{2}, \pi, \frac{3\pi}{2}$$

$$10. \sin(x) - 2\cos(x)\sin(x) = 0$$

$$\sin x (1 - 2\cos x) = 0$$

$$x = 0, \pi, 2\pi, \frac{\pi}{3}, \frac{5\pi}{3}$$

$$\sin x = 0 \quad \text{or} \quad \cos x = \frac{1}{2}$$

$$x = 0, \pi, 2\pi \quad x = \frac{\pi}{3}, \frac{5\pi}{3}$$