

## Review Problems

1. Compute the exact value of  $\sin x \cos x$  if we know that  $\tan x = -\frac{1}{3}$ .
2. Compute the exact value of  $\sin x$  if  $\cos x = -\frac{2}{5}$  and  $x$  is not in the second quadrant.
3. Simplify each of the following.
  - a)  $\sin 10^\circ + \sin 190^\circ$
  - b)  $\sin\left(\frac{7\pi}{3}\right) - \cos\left(\frac{17\pi}{4}\right)$
  - c)  $\cos 20^\circ + \cos 160^\circ$
4. True or false?
  - a) For all  $x$ ,  $\sin(x - 360^\circ) = \sin x$
  - b) For all  $x$ ,  $\cos(-x) = \cos x$
  - c) For all  $x$ ,  $\sin(-x) = \sin x$
  - d) For all  $x$ ,  $\tan(x + 180^\circ) = \tan x$
  - e) For all  $x$ ,  $\sin(x + 180^\circ) = -\sin x$
  - f) For all  $x$ ,  $\cos x = \cos(x + 180^\circ)$
  - g) For all  $x$ ,  $\sin 2x = 2 \sin x$
5. Which of the following is NOT equivalent to  $\sin x$ ?
  - A)  $\sin(180^\circ - x)$
  - B)  $\cos(90^\circ - x)$
  - C)  $\sin(x - 180^\circ)$
  - D)  $\sin(x + 360^\circ)$
6. Which of the following is NOT equivalent to  $\tan x$ ?
  - A)  $\tan(x + 180^\circ)$
  - B)  $\tan(360^\circ - x)$
  - C)  $\cot(90^\circ - x)$
  - D)  $\tan(x - 180^\circ)$
7. Solve each of the following equations. Present your answer in degrees and in radians.
  - a)  $\sin x = -\frac{1}{\sqrt{2}}$
  - b)  $\cos x = -\frac{\sqrt{3}}{2}$
  - c)  $\tan x = -\sqrt{3}$
  - d)  $\sin x = -\frac{3}{2}$
  - e)  $\cos x = -1$
  - f)  $\tan x = 0$
8. Solve each of the following equations. Present exact values of solutions.
  - a)  $\frac{2}{3} \log_2(5x - 1) = 4$
  - b)  $2 \ln(x + 1) - 8 = -2$
  - c)  $4 \log_{10}(x - 1) = 12$
  - d)  $3^{2x-1} = 7$
  - e)  $e^{3x+5} = -2$
  - f)  $e^{3x+5} = 2$
9. Graph each of the following functions.
  - a)  $f(x) = x^2 - 3x + 1$
  - b)  $f(x) = x^3$
  - c)  $f(x) = |x|$
  - d)  $f(x) = \sqrt{x}$
  - e)  $f(x) = \sqrt[3]{x}$
  - f)  $f(x) = \frac{1}{x}$
  - g)  $f(x) = \frac{1}{x^2}$
  - h)  $f(x) = x^3 - x$
10. Find the domain of each of the following functions.
  - a)  $f(x) = \frac{1}{x-2}$
  - b)  $f(x) = \sqrt{x-2}$
  - c)  $f(x) = \frac{1}{6x-x^2}$
  - d)  $f(x) = \sqrt{6x-x^2}$
  - e)  $f(x) = \frac{1}{x^2-7x-30}$
  - f)  $f(x) = \sqrt{x^2-7x-30}$

## Answers

1.)  $-\frac{3}{10}$     2.)  $-\frac{\sqrt{21}}{5}$     3.) a) 0    b)  $\frac{\sqrt{3}-\sqrt{2}}{2}$     c) 0

4.) a) true    b) true    c) false    d) true    e) true    f) false    g) false

5.) C    6.) B

7.) a)  $x = -45^\circ + k \cdot 360^\circ$  or  $x = -135^\circ + k \cdot 360^\circ$  where  $k \in \mathbb{Z}$

$$x = -\frac{\pi}{4} + 2k\pi$$
 or  $x = -\frac{3\pi}{4} + 2k\pi$  where  $k \in \mathbb{Z}$

b)  $x = \pm 150^\circ + k \cdot 360^\circ$  where  $k \in \mathbb{Z}$      $x = \pm \frac{5\pi}{6} + 2k\pi$  where  $k \in \mathbb{Z}$

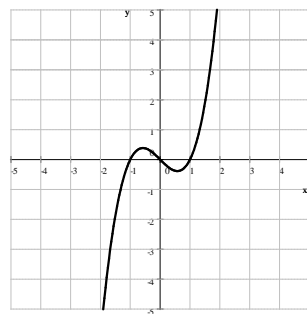
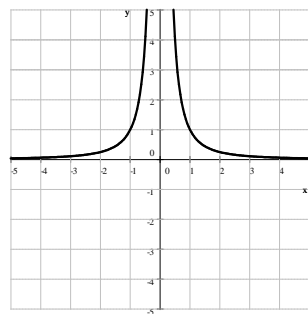
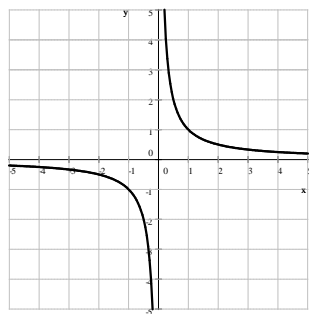
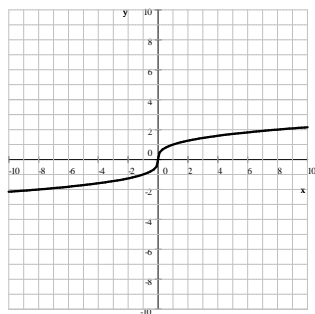
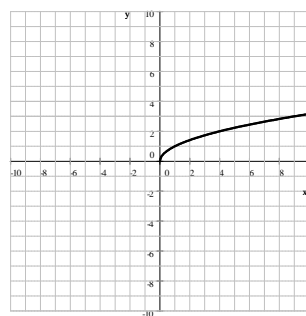
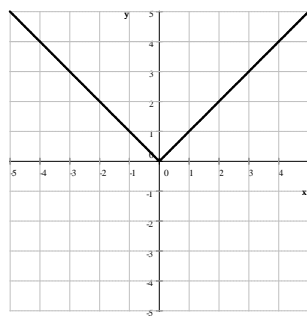
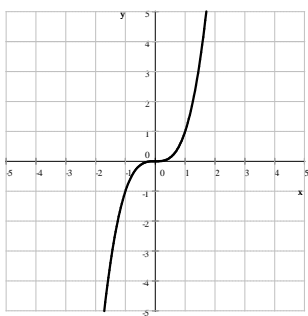
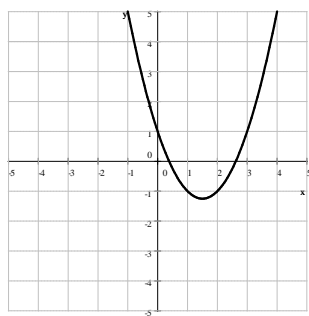
c)  $x = -60^\circ + k \cdot 180^\circ$  where  $k \in \mathbb{Z}$      $x = -\frac{\pi}{3} + k\pi$  where  $k \in \mathbb{Z}$

d) no solution    e)  $x = 180^\circ + k \cdot 360^\circ$  where  $k \in \mathbb{Z}$      $x = \pi + 2k\pi$  where  $k \in \mathbb{Z}$

f)  $x = k \cdot 180^\circ$  where  $k \in \mathbb{Z}$      $x = k\pi$  where  $k \in \mathbb{Z}$

8.) a) 13    b)  $e^3 - 1$     c) 1001    d)  $\frac{1}{2}(\log_3 7 + 1)$     e) no solution    f)  $\frac{1}{3}(\ln 2 - 5)$

9.) a)  $f(x) = x^2 - 3x + 1$     b)  $f(x) = x^3$     c)  $f(x) = |x|$     d)  $f(x) = \sqrt{x}$



e)  $f(x) = \sqrt[3]{x}$

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

g)  $f(x) = \frac{1}{x^2}$

h)  $f(x) = x^3 - x$

10.) a)  $x \neq 2$     b)  $x \geq 2$     c)  $x \neq 0, 6$     d)  $[0, 6]$     e)  $x \neq -3, 10$     f)  $(-\infty, -3] \cup [10, \infty)$