

AP Calculus AB

Summer Work

Name: _____

*Please follow the directions as indicated. This packet is **due on the first day of classes**. This assignment is worth 10 points and will be graded upon your arrival to school.*

Factoring Trinomials

Factor each completely.

1) $x^2 - 7x - 18$

2) $p^2 - 5p - 14$

3) $m^2 - 9m + 8$

4) $x^2 - 16x + 63$

5) $7x^2 - 31x - 20$

6) $7k^2 + 9k$

7) $7x^2 - 45x - 28$

8) $2b^2 + 17b + 21$

9) $5p^2 - p - 18$

10) $28n^4 + 16n^3 - 80n^2$

Combination and Composition of Functions

Perform the indicated operation.

1) $f(x) = 3x + 4$
 $g(x) = -2x^2 - 4$
Find $(f + g)(8)$

3) $f(t) = 2t - 3$
 $g(t) = t^3 + t$
Find $(f \cdot g)(0)$

5) $g(x) = x + 2$
 $f(x) = x^3 - 2x$
Find $(g \cdot f)(-4)$

7) $h(x) = -x + 5$
 $g(x) = -3x - 2$
Find $\left(\frac{h}{g}\right)(x)$

9) $f(x) = 2x + 5$
 $g(x) = 2x + 3$
Find $(f + g)(x)$

11) $g(t) = t^2 - 2$
 $f(t) = 4t + 4$
Find $g(t) \div f(t)$

13) $g(n) = 3n + 1$
 $h(n) = 2n - 3$
Find $(-4g + 5h)(-2n)$

15) $g(t) = 4t + 4$
 $f(t) = t^2 + 2t$
Find $(g - f)\left(\frac{t}{2}\right)$

2) $h(n) = -n^3 - 2n$
 $g(n) = -2n - 1$
Find $\left(\frac{h}{g}\right)(-4)$

4) $g(n) = -n + 5$
 $f(n) = n^2 - 1$
Find $(g \circ f)(6)$

6) $g(x) = x^2 + 2$
 $h(x) = 3x - 2$
Find $(g + h)(-3)$

8) $g(x) = 4x - 2$
 $h(x) = x^2 - 5x$
Find $g(x) - h(x)$

10) $h(t) = 2t - 2$
 $g(t) = 4t + 4$
Find $(h \cdot g)(t)$

12) $h(n) = 2n + 1$
 $g(n) = n - 2$
Find $h(n) - 5g(n)$

14) $h(n) = 3n - 1$
 $g(n) = 4n - 2$
Find $(h \circ g)(4 + n)$

16) $g(t) = 4t - 3$
 $f(t) = t^3 - 2$
Find $(g + f)(-t)$

Find f and g so that $h(x) = (f \circ g)(x)$. Neither function may be the identity function $f(x) = x$.

17) $h(x) = \frac{5}{x^2} + 1$

18) $h(x) = (\sqrt{x} + 1)^2$

19) $h(x) = \sqrt{5x + 1} + 1$

20) $h(x) = 3^{\sqrt{x} + 1}$

21) $h(x) = (\sqrt{x} + 3)^2$

22) $h(x) = \frac{4}{x^2} + 2$

Rational Expressions

Simplify each expression.

$$1) \frac{u-v}{8v} + \frac{6u-3v}{8v}$$

$$2) \frac{m-3n}{6m^3n} - \frac{m+3n}{6m^3n}$$

$$3) \frac{5}{a^2+3a+2} + \frac{5a+1}{a^2+3a+2}$$

$$4) \frac{5}{10n^2+16n+6} + \frac{n-6}{10n^2+16n+6}$$

$$5) \frac{r+6}{3r-6} + \frac{r+1}{3r-6}$$

$$6) \frac{x+2}{2x^2+13x+20} - \frac{x+3}{2x^2+13x+20}$$

$$7) \frac{6}{x-1} - \frac{5x}{4}$$

$$8) 6 - \frac{x+5}{(7x-5)(x+4)}$$

$$9) \frac{3}{x+7} + \frac{4}{x-8}$$

$$10) \frac{3}{4v^2+4v} - \frac{7}{2}$$

$$11) \frac{7}{3} - \frac{8}{12x-8}$$

$$12) \frac{5}{n+5} + \frac{4n}{2n+6}$$

$$13) \frac{2x}{5x+4} + \frac{6x}{2x+3}$$

$$14) \frac{2}{3x^2+12x} + \frac{8}{2x}$$

Rational Equations

Solve each equation. Remember to check for extraneous solutions.

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

$$2) \frac{5v-5}{v} - \frac{5v+15}{v} = 1$$

$$3) \frac{5a+20}{6a} + \frac{1}{a} = \frac{3}{2a}$$

$$4) \frac{2}{m^2} = \frac{1}{m} + \frac{1}{m^2}$$

$$5) 1 + \frac{4}{r-2} = \frac{5}{r-2}$$

$$6) \frac{n-1}{2n} = 1 + \frac{1}{2n}$$

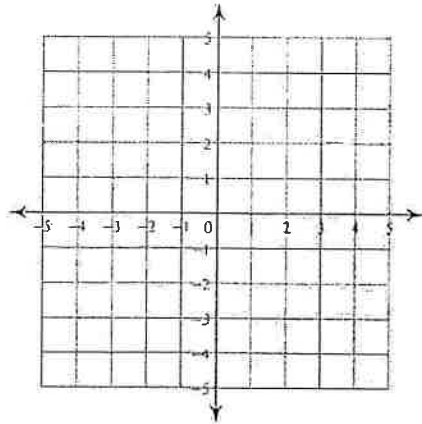
$$7) \frac{5}{k} = \frac{1}{k} - 1$$

$$8) \frac{5}{b} = \frac{1}{b} + 4$$

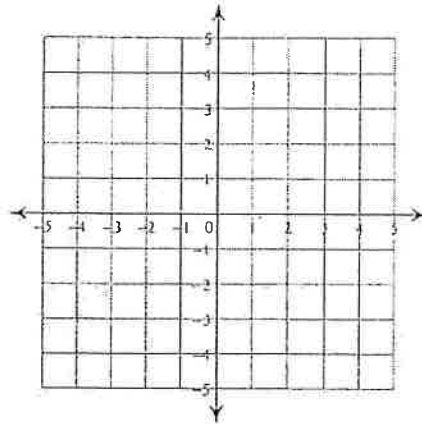
Systems of Equations

Solve each system by graphing.

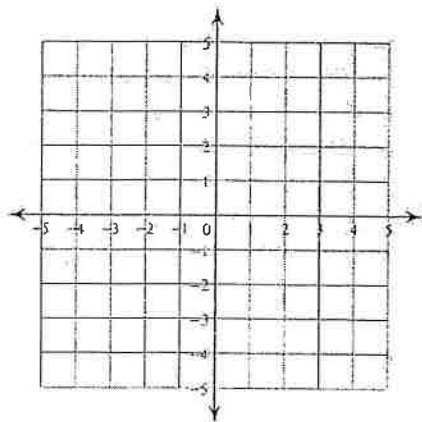
1) $y = -3x + 4$
 $y = 3x - 2$



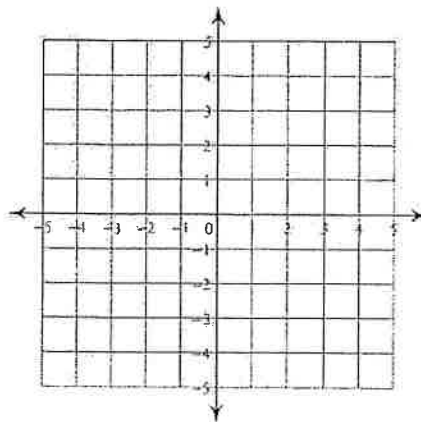
2) $y = x + 2$
 $x = -3$



3) $x - y = 3$
 $7x - y = -3$



4) $4x + y = 2$
 $x - y = 3$



Solve each system by substitution.

5) $y = 4x - 9$
 $y = x - 3$

6) $4x + 2y = 10$
 $x - y = 13$

7) $y = -5$
 $5x + 4y = -20$

8) $x + 7y = 0$
 $2x - 8y = 22$

$$\begin{aligned} 9) \quad & 6x + 8y = -22 \\ & y = -5 \end{aligned}$$

$$\begin{aligned} 11) \quad & 7x + 2y = -19 \\ & -x + 2y = 21 \end{aligned}$$

$$\begin{aligned} 13) \quad & -7x + 4y = 24 \\ & 4x - 4y = 0 \end{aligned}$$

$$\begin{aligned} 10) \quad & -7x + 2y = 18 \\ & 6x + 6y = 0 \end{aligned}$$

$$\begin{aligned} 12) \quad & 3x - 5y = 17 \\ & y = -7 \end{aligned}$$

$$\begin{aligned} 14) \quad & 4x - y = 20 \\ & -2x - 2y = 10 \end{aligned}$$

Solve each system by elimination.

$$\begin{aligned} 15) \quad & 8x - 6y = -20 \\ & -16x + 7y = 30 \end{aligned}$$

$$\begin{aligned} 16) \quad & 6x - 12y = 24 \\ & -x - 6y = 4 \end{aligned}$$

$$\begin{aligned} 17) \quad & -8x - 10y = 24 \\ & 6x + 5y = 2 \end{aligned}$$

$$\begin{aligned} 18) \quad & -24 - 8x = 12y \\ & 1 + \frac{5}{9}y = -\frac{7}{18}x \end{aligned}$$

$$\begin{aligned} 19) \quad & -4y - 11x = 36 \\ & 20 = -10x - 10y \end{aligned}$$

$$\begin{aligned} 20) \quad & -9 + 5y = -4x \\ & -11x = -20 + 9y \end{aligned}$$

$$\begin{aligned} 21) \quad & 0 = -2y + 10 - 6x \\ & 14 - 22y = 18x \end{aligned}$$

$$\begin{aligned} 22) \quad & -16y = 22 + 6x \\ & -11y - 4x = 15 \end{aligned}$$

$$\begin{aligned} 23) \quad & -16 + 20x - 8y = 0 \\ & 36 = -18y - 22x \end{aligned}$$

$$\begin{aligned} 24) \quad & -\frac{5}{7} - \frac{11}{7}x = -y \\ & 2y = 7 + 5x \end{aligned}$$

Critical thinking questions:

25) Write a system of equations with the solution $(4, -3)$.

- 1) The school that Lisa goes to is selling tickets to the annual talent show. On the first day of ticket sales the school sold 4 senior citizen tickets and 5 student tickets for a total of \$102. The school took in \$126 on the second day by selling 7 senior citizen tickets and 5 student tickets. What is the price each of one senior citizen ticket and one student ticket?

- 2) Flying with the wind a plane went 183 km/h. Flying into the same wind the plane only went 141 km/h. Find the speed of the plane in still air and the speed of the wind.

- 3) Castel and Gabriella are selling pies for a school fundraiser. Customers can buy apple pies and lemon meringue pies. Castel sold 6 apple pies and 4 lemon meringue pies for a total of \$80. Gabriella sold 6 apple pies and 5 lemon meringue pies for a total of \$94. What is the cost each of one apple pie and one lemon meringue pie?

- 4) The school that Imani goes to is selling tickets to the annual dance competition. On the first day of ticket sales the school sold 3 senior citizen tickets and 3 child tickets for a total of \$69. The school took in \$91 on the second day by selling 5 senior citizen tickets and 3 child tickets. What is the price each of one senior citizen ticket and one child ticket?

- 5) Ming and Carlos are selling cookie dough for a school fundraiser. Customers can buy packages of chocolate chip cookie dough and packages of gingerbread cookie dough. Ming sold 8 packages of chocolate chip cookie dough and 12 packages of gingerbread cookie dough for a total of \$364. Carlos sold 1 package of chocolate chip cookie dough and 4 packages of gingerbread cookie dough for a total of \$93. Find the cost each of one package of chocolate chip cookie dough and one package of gingerbread cookie dough.

- 6) Kayla's school is selling tickets to the annual dance competition. On the first day of ticket sales the school sold 3 senior citizen tickets and 5 child tickets for a total of \$70. The school took in \$216 on the second day by selling 12 senior citizen tickets and 12 child tickets. Find the price of a senior citizen ticket and the price of a child ticket.

Solve each system by substitution.

$$\begin{aligned} 1) \quad & -x - y - 3z = -9 \\ & z = -3x - 1 \\ & x = 5y - z + 23 \end{aligned}$$

$$\begin{aligned} 2) \quad & x = -4z - 19 \\ & y = 5x + z - 4 \\ & -5y - z = 25 \end{aligned}$$

$$\begin{aligned} 3) \quad & y = x + z + 5 \\ & z = -3y - 3 \\ & 2x - y = -4 \end{aligned}$$

$$\begin{aligned} 4) \quad & -2y + 5z = -3 \\ & y = -5x - 4z - 5 \\ & x = 4z + 4 \end{aligned}$$

$$\begin{aligned} 5) \quad & y = x + 4z - 5 \\ & 4x + 3y - 2z = 5 \\ & z = -2x + 2 \end{aligned}$$

$$\begin{aligned} 6) \quad & x = 3y - 3z + 8 \\ & z = 4x + 5y - 14 \\ & 3y + 2z = 14 \end{aligned}$$

$$\begin{aligned} 7) \quad & -5x - 3y + z = -4 \\ & -2x - 2y + 2z = 4 \\ & z = x + 5 \end{aligned}$$

$$\begin{aligned} 8) \quad & -4x + 2z = 14 \\ & y = x + z + 12 \\ & -2x - 4z = 22 \end{aligned}$$

Properties of Logarithms

Expand each logarithm.

1) $\log \frac{2}{3}$

2) $\log (3 \cdot 11)$

3) $\log (6 \cdot 7)$

4) $\log (5 \cdot 11)$

5) $\log (7 \cdot 8)$

6) $\log \frac{12}{11}$

7) $\log \sqrt[3]{x}$

8) $\log \sqrt{x}$

9) $\log (a \cdot b)$

10) $\log x^5$

11) $\log (u \cdot v)^6$

12) $\log (ab^5)$

Condense each expression to a single logarithm.

13) $\log 6 - \log 5$

14) $\log 12 + \log 5$

15) $\log 6 + \log 7$

16) $\log 12 - \log 11$

17) $3 \log x$

18) $6 \log a$

19) $\log a - \log b$

20) $\frac{\log x}{2}$

21) $\log x + 5 \log y$

22) $6 \log u - 6 \log v$

23) $4 \log x + 4 \log y$

24) $\log u + \log v + \log w$

Critical thinking questions:

25) $2(\log 2x - \log y) - (\log 3 + 2 \log 5)$

26) $\log x \cdot \log 2$

Exponential Equations

Solve each equation. Round your answers to the nearest ten-thousandth.

1) $17^v = 62$

2) $9^k = 39$

3) $9^n = 29$

4) $13^x = 15$

5) $10^b = 74$

6) $20^r = 58$

7) $15^x = 47$

8) $13^r = 79$

9) $8 \cdot 13^{7x} = 73$

10) $-8 \cdot 9^{-5x} = -49$

11) $9 \cdot 9^{k+2} = 59$

12) $17^{k-10} + 4 = 66$

$$13) 5^{4x} + 5 = 91$$

$$14) 10^{-9n} + 8 = 34$$

$$15) e^{r+4} + 6 = 29$$

$$16) -10 \cdot 8^{-5n} = -81$$

$$17) 5.9e^{10x-8} + 0.7 = 43$$

$$18) -3e^{5a+1} - 7 = -91$$

$$19) -5.3e^{8x+5} + 2.9 = -27$$

$$20) -4e^{2.2n-7} + 1 = -59$$

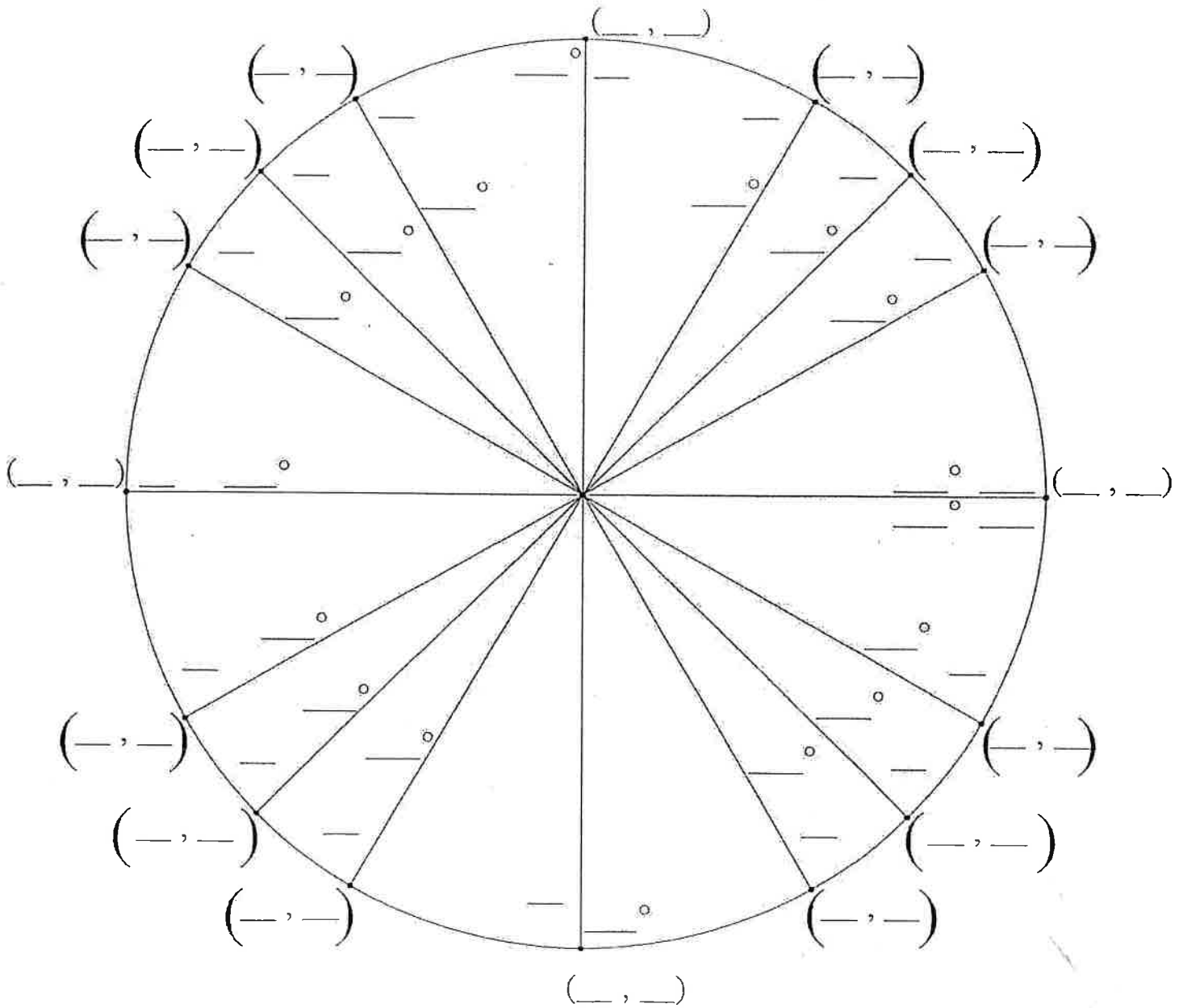
$$21) 7e^{2-3x} + 3 = 92$$

$$22) -5e^{-6m-8} - 6 = -37$$

$$23) 5e^{2.9m-2} + 6 = 94$$

$$24) -3e^{4x+1} - 2 = -98$$

Fill in The Unit Circle



Trigonometric Functions and The Unit Circle

Use a calculator to find each. Round your answers to the nearest ten-thousandth.

1) $\cos 101^\circ$

2) $\cos 310^\circ$

3) $\sin 105^\circ$

4) $\sin -305^\circ$

5) $\sin -228^\circ$

6) $\sin -120^\circ$

7) $\cos -70^\circ$

8) $\cos 140^\circ$

Find the exact value of each trigonometric function. Some may be undefined.

9) $\tan \frac{2\pi}{3}$

10) $\sec -\frac{3\pi}{4}$

11) $\cos \frac{11\pi}{6}$

12) $\cot \frac{5\pi}{3}$

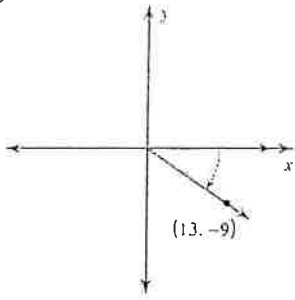
13) $\csc -\frac{\pi}{2}$

14) $\tan -\frac{3\pi}{2}$

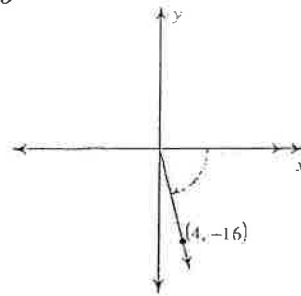
15) $\sec 0$

16) $\tan -\frac{7\pi}{4}$

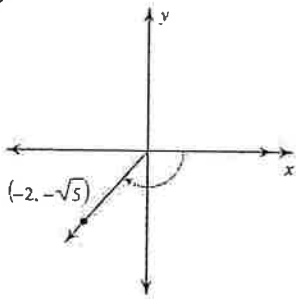
17) $\sec \theta$



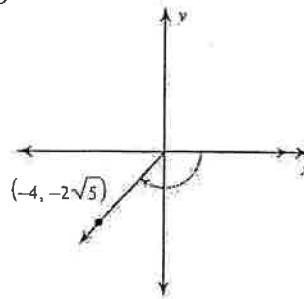
18) $\sin \theta$



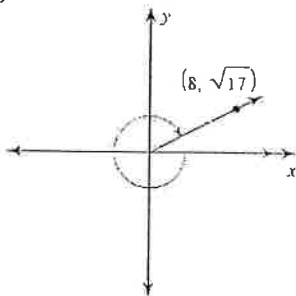
19) $\cos \theta$



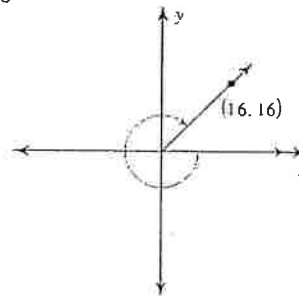
20) $\sin \theta$



21) $\cos \theta$



22) $\cos \theta$



Evaluating Limits using Substitution

Evaluate each limit.

1) $\lim_{x \rightarrow 0} -1$

2) $\lim_{x \rightarrow -4} (-x - 4)$

3) $\lim_{x \rightarrow -2} (2x + 3)$

4) $\lim_{x \rightarrow 3} (-x^3 + 13x^2 - 56x + 81)$

5) $\lim_{x \rightarrow 2} (x^3 - 2x^2 - 2)$

6) $\lim_{x \rightarrow 5} -\sqrt{2x + 1}$

7) $\lim_{x \rightarrow -2} \sqrt[3]{-2x - 3}$

8) $\lim_{x \rightarrow -3} \frac{x - 3}{x^2 + 2x + 2}$

9) $\lim_{x \rightarrow 2} \frac{x - 6}{x^2 - 4x + 3}$

10) $\lim_{x \rightarrow \frac{\pi}{6}} \cos(x)$

Critical thinking questions:

11) Give an example of a limit that evaluates to 5.

12) Give an example of a limit of a quadratic function where the limit evaluates to 16.