

Name: _____

Date: _____

Section: _____

Key Concept Review

Please do not use a calculator for this assignment. Show all of your work clearly. You may check your work with your calculator after you complete the problem

Working with Fractions: Simplify the following expressions. Express fractions in lowest terms. Do not use mixed numbers.

1. $\frac{3}{7} + \frac{2}{3}$

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

Function Values: Compute the following values for the given function.

$$f(x) = x^2 + 10$$

1.) $f(5)$

2.) $f(x + 5)$

3. $f(x + h)$

4. $\frac{f(x+h)-f(x)}{h}$

Name: _____

Date: _____

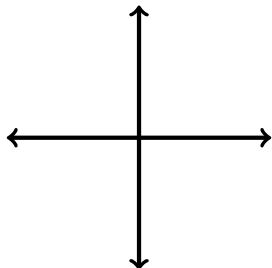
Section: _____

Transformations of Functions: Remember the effects of transforming a function. The effects of transforming by a value a are given below:

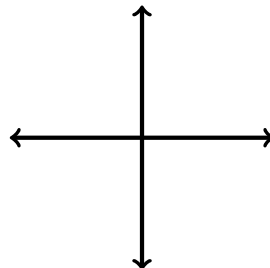
- $f(x) \pm a$ Shift up or down by the value a .
- $f(x \pm a)$ Shift left or right by the value a . Opposite of sign.
- $af(x)$ Stretch or compress by the value of a . Compress if $a < 1$ and stretch otherwise.
- $-f(x)$ Reflect over the x -axis.
- $f(-x)$ Reflect over the y -axis.

Plot the following functions.

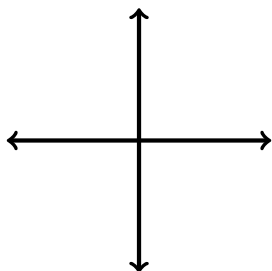
1. $x^2 + 2$



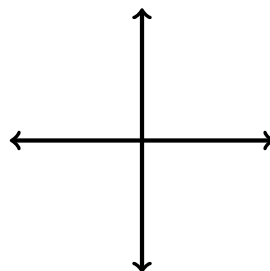
2. $-3x^3 + 1$



3. $\sqrt{x-3} + 1$



4. $f(x) = \sqrt{x}$. Plot $f(-x)$.



Name:

Date:

Section:

Domain and Range: The *domain* of a function is the set of all valid input (usually x) values. The *range* of a function is the set of all output (usually y) values. When finding the domain and range of a function, it is usually easiest to find where there are domain issues and proceed from there. The usual issues are:

- Dividing by zero (technically gives you infinity).
- Taking an even root of a negative value (complex solution, but we only deal with real numbers in this class).

Find the domain and range of each of the following functions.

1. $f(x) = x^2$

2. $g(x) = \frac{1}{x+3}$

3. $f(t) = 3\sqrt{t+10}$

4. $g(x) = \frac{1}{x^2-4}$

Name: _____

Date: _____

Section: _____

Exponents: Let a be the base of the exponent. Remember the following rules:

- Multiplication: $a^n a^m = a^{n+m}$ (When the base is multiplied, you add the exponents.)
- Division: $\frac{a^n}{a^m} = a^{n-m}$ (When the base is divided, you subtract the exponents starting with the numerator.)
- Power to a Power: $(a^n)^m = a^{n \cdot m}$ (Multiply exponents when you have a power to a power.)
- Roots: $\sqrt[m]{a^n} = a^{\frac{n}{m}}$ (Divide exponents when there are roots with the root being in the denominator.)
- Inverse: $a^{-1} = \frac{1}{a}$ (Anything to the power of -1 is a reciprocal.)

Using these rules, simplify the following expressions.

1. $3(2^3)$

2. $(x^{24})^{\frac{1}{3}}$

3. $\sqrt[2]{9^3}$

4. $\frac{2x^4y^{-4}}{8x^7y^3}$

Name: _____

Date: _____

Section: _____

Logarithms: Remember the following rules for logarithms. These rules are shown with $\ln(x) = \log_e(x)$, but are also true for logarithms with any base.

- Product: $\ln(ab) = \ln(a) + \ln(b)$ (Note that $\ln(a)\ln(b) \neq \ln(ab)$.)
- Quotient: $\ln(\frac{a}{b}) = \ln(a) - \ln(b)$ (Note that $\frac{\ln(a)}{\ln(b)} \neq \ln(\frac{a}{b})$.)
- $\ln(e) = 1$.
- $\log_a(b) = x \iff a^x = b$.

Using these rules, simplify the following expressions.

1. $\ln(xy)$

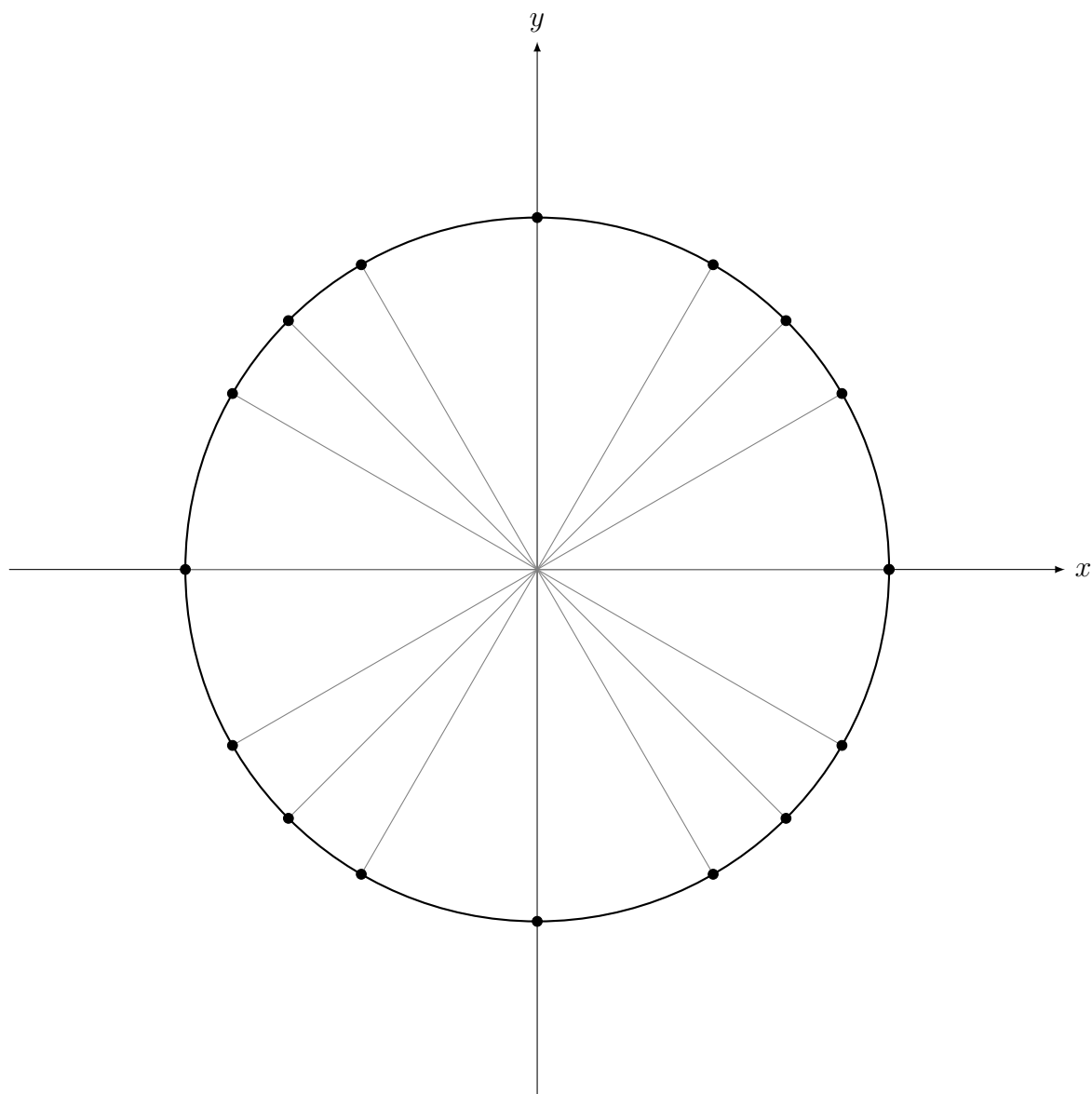
2. $\log_4(64)$

3. $\ln(\frac{2t}{3u})$

4. Solve $\log_x(16) = 4$ for x .

Name: _____ Date: _____ Section: _____

Fill in each of the coordinates with the correct x and y values.
Make sure to include the angle measure for each coordinate pair
in RADIANS.



Name:

Date:

Section:

Unit Circle: Use your knowledge of the Unit Circle to evaluate the following expressions.

1. $\cos\left(\frac{\pi}{3}\right)$

2. $\tan\left(\frac{\pi}{4}\right)$

3. $\sin\left(\frac{5\pi}{6}\right)$

4. $\sec(\pi)$

Name:

Date:

Section:

Calculating Velocity From Position: Recall that the average velocity of an object can be calculated as

$$\frac{\text{change in position}}{\text{change in time}} = \frac{\Delta P(t)}{\Delta t} = \frac{P(t_2) - P(t_1)}{t_2 - t_1}.$$

1. A car is driven on a straight road, and the distance traveled by the car after time $t = 0$ is given by a quadratic function s , where $s(t)$ is measured in feet and t is measured in seconds for $0 \leq t \leq 15$. Give an estimate of the velocity of the car at $t = 7$ using the average velocity from times $t = 6$ and $t = 8$ seconds.

Rates of Change: Recall that the average rate of change of a function between the points (x_1, y_1) and (x_2, y_2) is equal to the slope

$$\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}.$$

If we make the points really close together in the x coordinate, then we can estimate the rate of change at a single point, which is also called the instantaneous rate of change. The closer the points are, the better the estimate will be.

1. Consider a function $f(x)$. Write a good estimate for the slope of $f(x)$ at the point $x = 4$ in the form given above.