

What students need to know for... CALCULUS (Regular, AB and BC)

Students expecting to take Calculus should demonstrate the ability to:

General:

- keep an organized notebook
- take good notes
- complete homework every night
- be active learners
- ask questions and participate in class
- seek help outside of class if needed
- work with others
- work with and without a calculator

Specific Math Skills

1) Algebra

- can manipulate with ease fractions, decimals and variables in a variety of settings including in equations and rational functions
- comfortable with all forms of factoring including quadratics, sum and difference of cubes, quartics and factoring by grouping
- add, subtract, multiply and divide radical expressions including rationalizing denominators
- solving equations involving logarithms and rational exponents

2) Graphing

- be familiar with the graphs of linear, absolute value, quadratic, cubic, quartic, logarithmic and exponential functions
- identify the domain and range of functions
- recognize end behaviors of graphs
- be comfortable with both parametric and polar graphing.

3) Trigonometry

- work with the basic six trig functions including manipulating them to simplify expressions and solve equations by finding all solutions
- know the trig identities
- memorize the trig table of values
- know the graphs of the six basic trig functions including their domain and range

Welcome to Calculus! Calculus will be challenging but rewarding!! This full year course requires that everyone work hard and study for the entirety of the class. You will need a large binder or notebook and a graphing calculator.

Review Problems:

***NOTE:** Show all of your work. Your teacher may give a quiz on this material at the beginning of the year. **You should “Google” the topic if you are unsure how to complete the examples. Khanacademy.org has some good instructional videos.**

Name _____

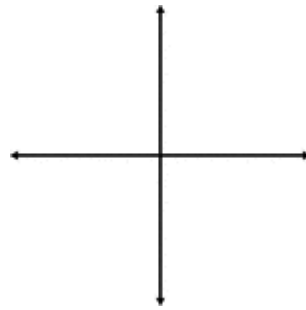
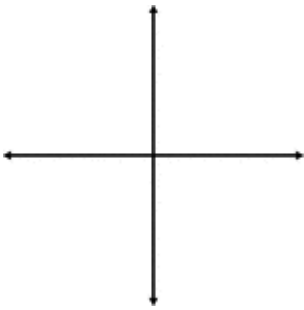
Date _____

Some Simple Review Problems:

I. Sketch the graph of each function & state the domain and range of each:

A) $y = x$

B) $y = x^2$



Domain:

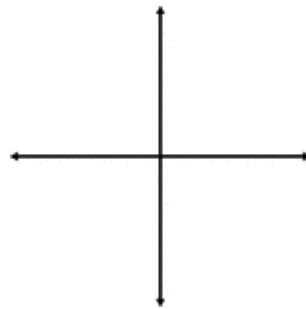
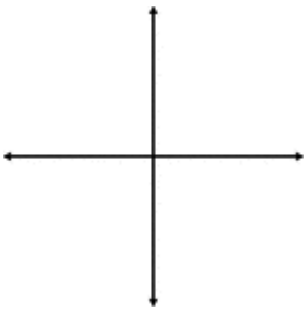
Domain:

Range:

Range:

C) $y = x^3$

D) $y = \frac{1}{x}$



Domain:

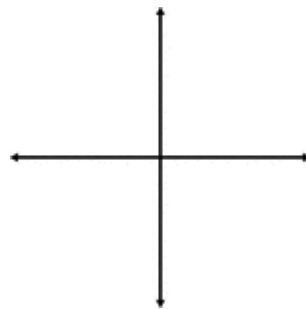
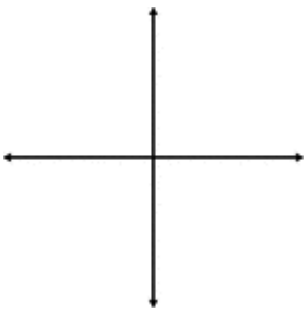
Domain:

Range:

Range:

E) $y = \sqrt{x}$

F) $y = e^x$



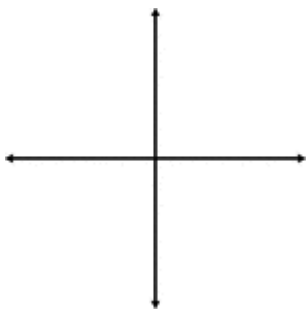
Domain:

Domain:

Range:

Range:

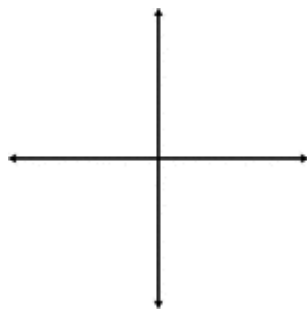
G) $y = \ln x$



Domain:

Range:

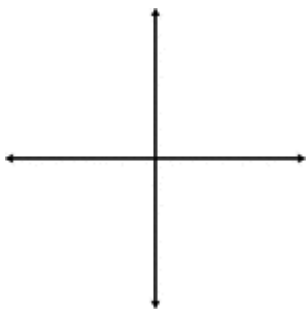
H) $y = \sin x$



Domain:

Range:

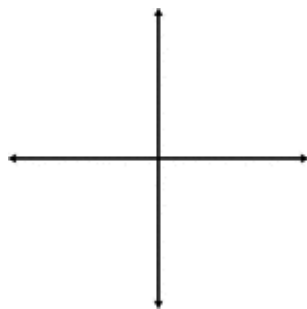
I) $y = \cos x$



Domain:

Range:

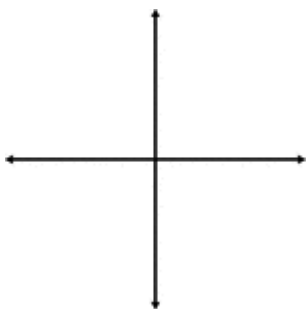
J) $y = \tan x$



Domain:

Range:

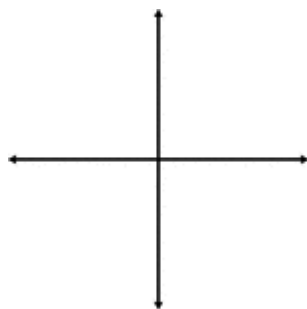
K) $y = |x|$



Domain:

Range:

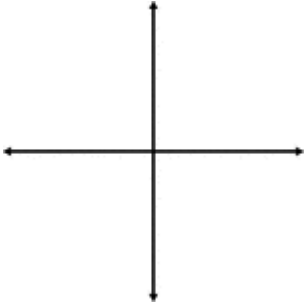
L) $y = \sqrt[3]{x}$



Domain:

Range:

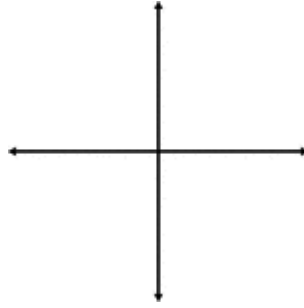
$$M) y = \frac{1}{1 + e^{-x}}$$



Domain:

Range:

$$N) y = \sqrt{4 - x^2}$$



Domain:

Range:

II. Factor each of the following completely or state that it is prime.

A) $x^2 + 5x + 6$

B) $x^2 - 4x - 12$

C) $x^2 + 5x - 24$

D) $16x^2 - 81$

E) $x^3 - y^3$

F) $x^3 + 4x^2 + 3x$

G) $x^4 + 6x^2 + 9$

H) $x^4 - 16x^3 - y^3$

Transcendental Functions: Trig, Exponential, and Logarithmic Functions

Trig Facts: You will need to know these as you know your multiplication tables.

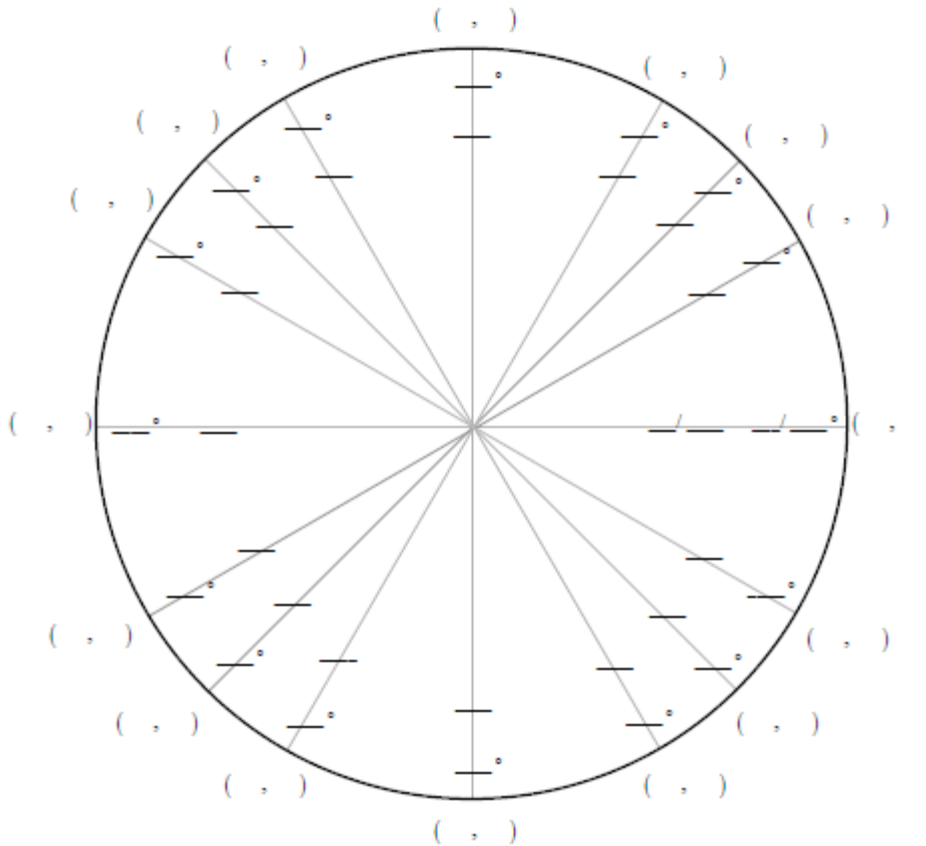
The values for sin, cos, and tan in Quadrant I should be *memorized cold*. The other Quadrants' values should not take you more than a few seconds to say when quizzed.

Every trig function takes an angle as input and returns a ratio as output.

So, every inverse trig function takes a ratio as input and returns _____ as output.

III. Fill out the following 16 point unit circle by finding the following:

- 1) The measures for each angle in radian and in degree.
- 2) The coordinate pair for each angle.



IV. 1) Find all values of x (to the nearest thousandth) which make the statement true.

$$-\cos 2x = e^{-x^2}, -\pi \leq x \leq \pi$$

2) Use a grapher to solve $\sin(x) = e^{-x^2}$

V. Simplify each expression into a real number without a calculator.

$$\ln(\sqrt[3]{e^2}) =$$

$$e^{2\ln 4} =$$

$$\ln\left[\sin^2\left(\frac{13\pi}{7}\right) + \cos^2\left(\frac{13\pi}{7}\right)\right] =$$

$$\sec^2(2.1) - \tan^2(2.1) =$$

$$\tan^{-1}\left(\frac{-\sqrt{3}}{3}\right) =$$

$$e^{2+\ln 4} =$$

$$\ln|-1| =$$

VI. Re-write each as a single logarithm or trig function.

$$\ln(x+2) + \ln(x-4) - \ln(x-3) =$$

$$\cos^2(x+5) - \sin^2(x+5) =$$

$$\frac{\ln(x)}{\ln(3)} =$$

$$\sin(3x)\cos(3x) =$$

VII. Write the formula for each transformation of: $y = \sqrt{x}$

A) translate right four units, up 3 units

B) a reflection about the x-axis and a vertical stretch to 3 times its height

C) a reflection about the y-axis and then translate right 3 units.

D) translation 3 units left and a horizontal shrink to $\frac{1}{4}$ its usual size.

VIII. Simplify

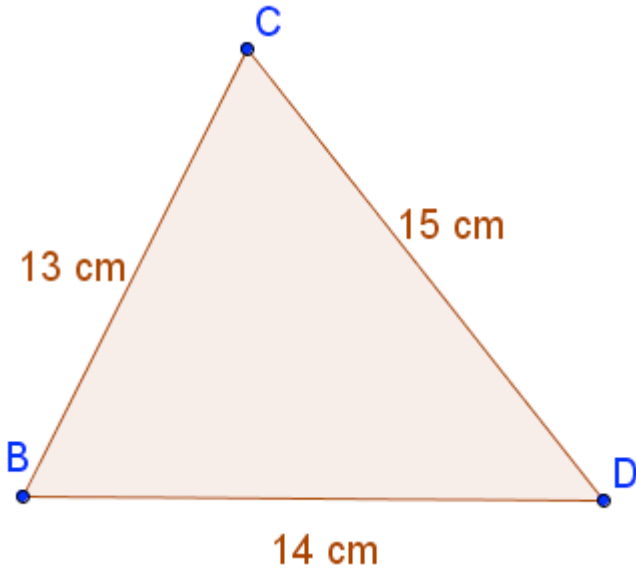
A) $\frac{100!}{97!}$

B) $\frac{(n+1)!}{(n-1)!}$

C) $\frac{(x+4)^2 - 16x}{x-4}$

D) $\frac{y+3}{(y+4)^2 - (8y+25)}$

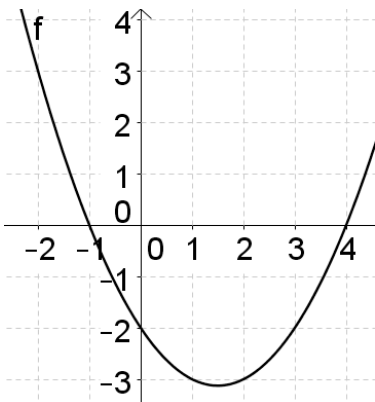
IX. 1) Given the following triangle, find the measure of all three angles to the nearest thousandth of a radian.



2) What is the area of a triangle with side length s ?

3) What is the area of a semicircle with diameter d ?

4) Given the graph of the quadratic function $y = f(x)$. Find the formula of $f(x)$.



X.

a) Simplify into one fraction: $\frac{3}{a} + \frac{7}{b}$

b) Solve for x *without* a calculator or grapher:

A) $1 + \frac{x}{3} = \frac{4}{5}$

B) $\frac{2}{3} - \frac{5}{7} = x$

C) $\frac{3}{8} = \frac{4}{1-x}$

D) $\frac{6}{x} + \frac{x}{2} = 4$

E) $\ln(x-2) = 4$

F) $-3\ln(x+1) = 2$

G) $\ln(x-2) + \ln(3) = 5$

H) $4e^{3x-2} = 8$

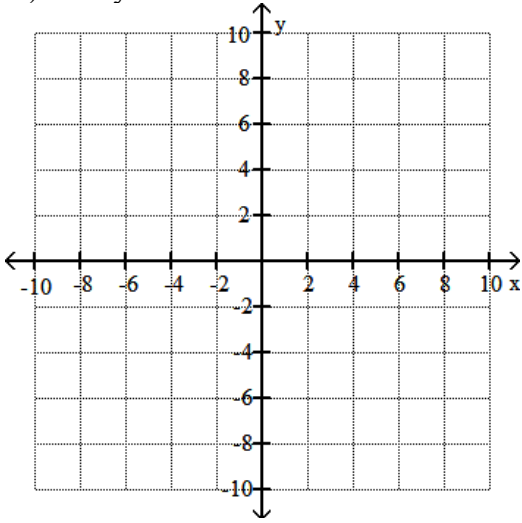
I) $100 = 200e^{-0.06x}$

J) $\sin x = -\frac{\sqrt{2}}{2}$, for $0 \leq x \leq 2\pi$

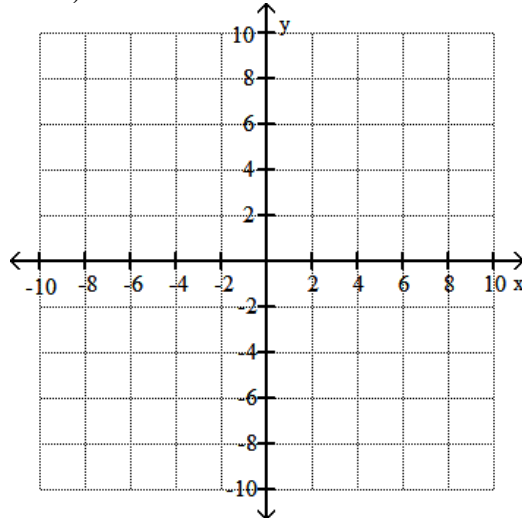
K) $3x^2 + 7x + 3 = 0$

XI. For AP Calculus BC students only: Graph the following.

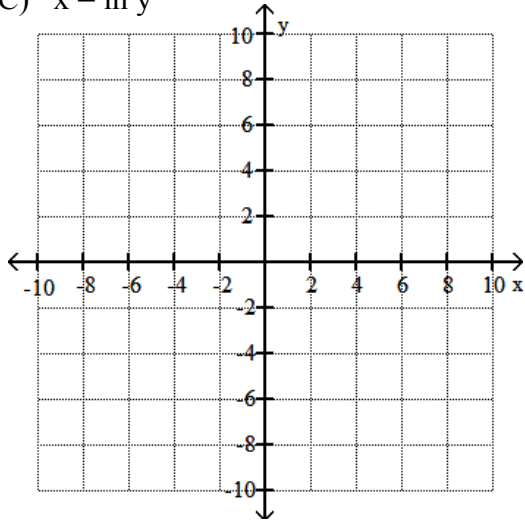
A) $x = y^2 - 4$



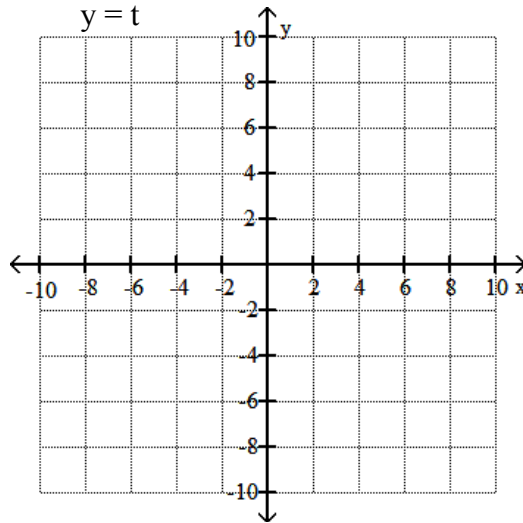
B) $x = 3$



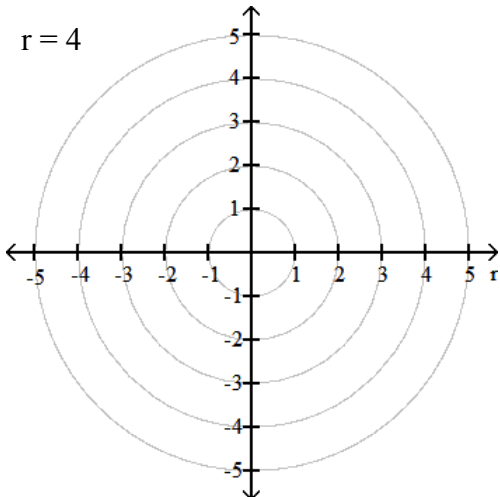
C) $x = \ln y$



D) $x = t^2 - 3t + 2$, for $0 < t < 4$
 $y = t$



e) $r = 4$



f) $r = 2 + \cos \theta$

