Welcome to AP Calculus!!!!!!!

Congratulations on enrolling in the most challenging math class offered in high school. Calculus is the study of how things change. The AP version of this course is theory based. In order to do the mechanics of the course it will be very important that you know the theory behind it. You will need to incorporate the theory and the mechanics of the course and then apply that knowledge to questions that you have never seen before. Anything that you ever learned in math might come into play in a question.

The attached assignment is a review of some very important facts and concepts that are used in Calculus. You have done all these topics in the past.

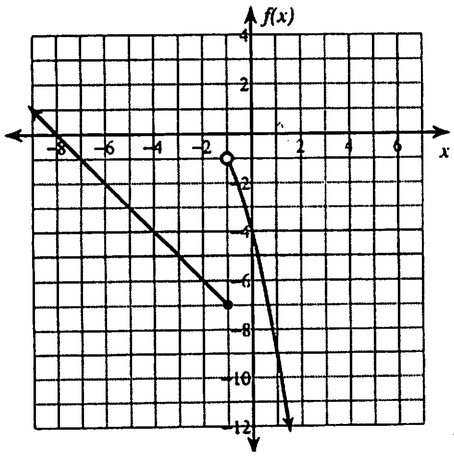
Everything should be done without a calculator since you will not be using a calculator for our first test.

You will need a separate notebook for Calculus. You will NOT be taking notes on your device.

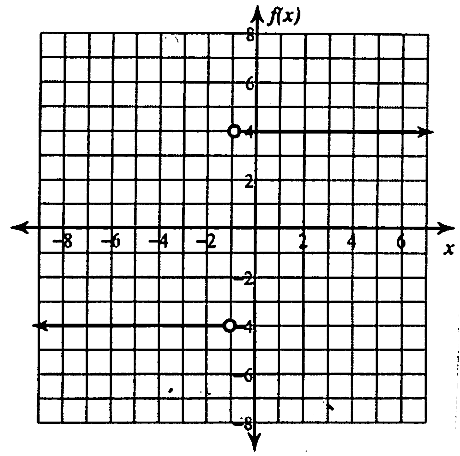
LIMITS NAME______________________________

1) Find $\lim\limits_{x \to -1^-} f(x) =$ $\lim\limits_{x \to -1^+} f(x) =$ $\lim\limits_{x \to -1} f(x) =$

a)



b)



2) Change the given function into a piecewise function and then evaluate the limit algebraically

a) $\lim\limits_{x \to -1} \frac{3|x+1|}{x+1}$

b) $\lim\limits_{x \to 0^-} \frac{|x|}{x}$

For numbers 3 - 10, evaluate each limit algebraically

3) $\lim\limits_{x \to 0^+} f(x),\ f(x) = \begin{cases} 1, & x \le 0 \\ -x^2 + 4x - 3, & x > 0 \end{cases}$

4) $\lim\limits_{x \to 1} f(x),\ f(x) = \begin{cases} \frac{x}{2} + \frac{9}{2}, & x < 1 \\ x^2 - 6x + 10, & x \ge 1 \end{cases}$

5) $\lim_{x \to -1^-} f(x),\ f(x) = \begin{cases} x+2, & x \le -1 \\ -\dfrac{x}{2} - 4, & x > -1 \end{cases}$

6) $\lim_{x \to -2} f(x),\ f(x) = \begin{cases} x^2 + 6x + 8, & x < -2 \\ -\dfrac{x}{2} - 1, & x \ge -2 \end{cases}$

7) $\lim_{x \to 2} \frac{x^3 - 8}{x - 2}$

8) $\lim_{x \to \infty} \frac{\sqrt{6+9x^2}}{3x-2}$

9) $\lim_{x \to -\infty} \frac{\sqrt{x^2 - 1}}{4x + 3}$

10) $\lim_{x \to 6} \frac{2x^2 - 15x + 18}{x - 6}$

For #11 - 18, Solve for x:

11) $\log 3x^2 - \log 3 = 2$

12) $4 + 3e^{1+2x} = 22$

13) $5^{2x+1} = 26$

14) $3(x+2)^{\frac{2}{3}} + 4 = 79$

15) $2\sin x - \csc x = 0$ $\quad 0 \leq x \leq 2\pi$

16) $3\tan^3 x = \tan x$ $\quad 0 \leq x \leq 2\pi$

17) $\cos 2x - \sin x + 2 = 0$ $\quad 0 \leq x \leq 2\pi$

18) $2\sin 2x - 1 = 0$ $\quad 0 \leq x \leq 2\pi$

Important Information that you must Know

Trigonometry Facts to Remember

$$\sin^2 A + \cos^2 A = 1$$

$$1 - \sin^2 A = \cos^2 A$$

$$1 - \cos^2 A = \sin^2 A$$

$\sec^2 A = \tan^2 A + 1$

$\csc^2 A = 1 + \cot^2 A$

$$\frac{\sin x}{\cos x} = \tan x$$

$$\frac{\cos x}{\sin x} = \cot x$$

$$\frac{1}{\sin x} = \csc x$$

$$\frac{1}{\cos x} = \sec x$$

$$2\sin x\cos x = \sin 2x$$

$$2\cos^2 x - 1 = \cos 2x$$

$$1 - 2\sin^2 x = \cos 2x$$

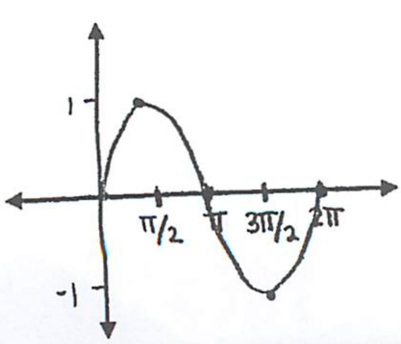
$$\cos^2 x - \sin^2 x = \cos 2x$$

The graph of sinx is symmetric about the origin and is odd.

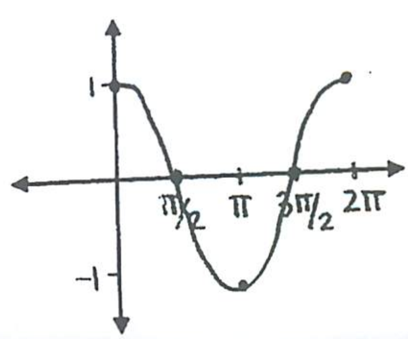
The graph of cosx is symmetric about the y − axis and is even.

	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$	π	$3\pi/2$	2π
$\sin\theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	−1	0
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	−1	0	1
$\tan\theta$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	undefined	0	undefined	0
$\csc\theta$	undefined	2	$\sqrt{2}$	$\frac{2\sqrt{3}}{3}$	1	undefined	−1	undefined
$\sec\theta$	1	$\frac{2\sqrt{3}}{3}$	$\sqrt{2}$	2	undefined	−1	undefined	1
$\cot\theta$	undefined	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	undefined	0	undefined

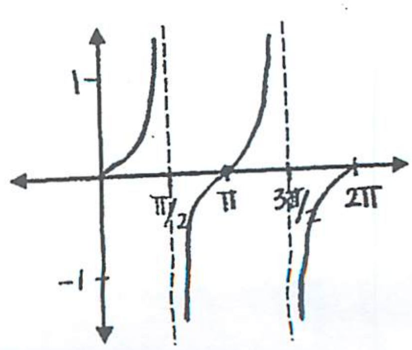
$y = \sin x$



$y = \cos x$



$y = \tan x$



Important information that you must Know

Holes, Poles, Zeros and End Zones

Holes: A hollow circle on a graph. Holes are found where the denominator equals zero in a reducible term.

Poles: These are vertical asymptotes. Graphs never cross or touch a vertical asymptote. Poles are found where the denominator equals zero in a non-reducible term.

Even Asymptotes	**vs.**	**Odd Asymptotes**
The term has an even exponent		The term has an odd exponent
The graph will go in the same direction on each side of the asymptote		The graph will go in opposite directions on each side of the asymptote

Zeros: Also known as Roots. This is where the graph will hit the x axis. Zeros are found where the numerator equals zero in a non-reducible term.

Even Roots	**vs.**	**Odd Roots**
The term has an even exponent		The term has an odd exponent
The graph will be tangent to the x axis		The graph will cut through the x axis

End Zones: These are horizontal asymptotes. It is where the graph levels off as you go to ∞ or - ∞. This is determined by comparing the degree of the top and bottom of the rational expression.

$\frac{\text{Small degree}}{\text{Large degree}} \Rightarrow$ y = 0 is the horizontal asymptote

$\frac{\text{Large degree}}{\text{Small degree}} \Rightarrow$ No horizontal asymptote

$\frac{\text{Same degree}}{\text{Same degree}} \Rightarrow$ y = the ratio of the leading coefficients is the horizontal asymptote