Robbinsville High School
Mathematics Department
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Dear Students,

Welcome to AP Calculus BC! Attached you will find a summer assignment for math reinforcement for the upcoming school year. There are two parts to this assignment.

PART I: Summer Review Packet

The packet attached should be completed and returned to school on the ***first full day of school***. I will give you an answer key on the first day of school. The packet will be **collected** and **graded** as **a 10 point homework grade** based on **completion** and **effort**. Work is required for many of these problems, so unsupported answers will not receive credit.

The packet covers important material from Honors PreCalc and Limits. The packet itself is only a sampling of concepts and questions that are prerequisite for entering AP Calc. In addition to the packet, Khan Academy is a great place to review limits and assess your understanding. Any of the videos/lessons/quizzes under the **"Limits and Continuity"** section will be helpful.

PART II: Khan Academy Lessons

Go to **www.khanacademy.org/join** and enter your class code **S6JTQG7U**.

You will be learning about Differentiation (taking derivatives) on Khan Academy this summer. I have assigned videos to watch and problems sets from the unit called "Differentiation: Definition and Basic Derivative Rules." It's a fair amount of work and not something you will want to save until the night before school starts. So, I have given due dates to help you spread out the work:

Due August 10th: "Defining Average and Instantaneous Rates of Change at a Point"
(5 videos, 3 exercise sets, 1 article)

Due August 31st: "Defining the Derivative of a Function and Using Derivative Notation"
(6 videos 1 exercise set, 1 article)
"Estimating Derivatives of a Function at a Point"
(1 video, 1 exercise set)

This part of the assignment is worth 10 points based on completion. Points will be deducted for late submissions.

Your first test will be within the first two weeks of school and will cover material from both parts of the summer assignment.

If you have any questions while completing the packet, please feel free to email me over the summer at sawin@rvilleschools.org. I check my email every couple of weeks in the summer.

Have a great summer!
Ms. Sawin

PreCalc Review (Ch. 1)

1. Evaluate the following trig values without a calculator:

a) $\cos\frac{\pi}{2} =$ _____ b) $\tan\frac{3\pi}{4} =$ _____ c) $\sin\left(-\frac{\pi}{3}\right) =$ _____

d) $\sin\frac{3\pi}{2} =$ _____ e) $\cot\pi =$ _____ f) $\csc\frac{11\pi}{6} =$ _____

g) $\tan\frac{5\pi}{3} =$ _____ h) $\sec\frac{\pi}{4} =$ _____ i) $\tan\left(-\frac{\pi}{2}\right) =$ _____

2. Evaluate the following without a calculator. Give all answers in radians.

a) $\arccos(1)$ $\arccos(1)$ _____ b) $\arcsin(-1)$ $\arcsin(-1)$ _____ c)
$\arctan\left(\frac{\sqrt{3}}{3}\right)$ $\arctan\left(\frac{\sqrt{3}}{3}\right)$ _____

d) $\arctan(-1)$ $\arctan(-1)$ _____ e) $\arccos\left(-\frac{\sqrt{2}}{2}\right)$ $\arccos\left(-\frac{\sqrt{2}}{2}\right)$ _____ f)
$\arcsin\left(-\frac{1}{2}\right)$ $\arcsin\left(-\frac{1}{2}\right)$ _____

g) $\arctan(0)$ $\arctan(0)$ _____ h) $\arccos\left(\frac{1}{2}\right)$ $\arccos\left(\frac{1}{2}\right)$ _____ i)
$\arccos\left(-\frac{\sqrt{3}}{2}\right)$ $\arccos\left(-\frac{\sqrt{3}}{2}\right)$ _____

j) $\arcsin\left(\sin\frac{2\pi}{3}\right)$ _____ k) $\sin\left(\arcsin\left(-.25\right)\right)$ _____ l) $\arctan\left(\tan\left(-\frac{\pi}{6}\right)\right)$ _____

m) $\arccos\left(\cos\left(\frac{3\pi}{2}\right)\right)$ _____ n) $\cos\left(\arccos\left(-5\right)\right)$ _____ o) $\arctan\left(\tan\left(\frac{7\pi}{6}\right)\right)$ _____

Section 2.1: Rates of Change and Limits

Find the limits below. Be sure to show all work and give exact answers.

1) $\lim_{x->0}\frac{x^2}{x+5} =$ 2) $\lim_{x->5} 6 =$ 3) $\lim_{x->3}\frac{(x-4)^2}{x+3} =$

4) $\lim_{x->0} 3x\cos x =$ 5) $\lim_{x->0}\frac{\sin 3x}{6x} =$ 6) $\lim_{x->-2}\frac{x^2+x-2}{x^2+5x+6} =$

7) $\lim_{x->7} \frac{\sqrt{2x-5}-3}{x-7}$ =

8) $\lim_{x->0} \frac{\frac{1}{(x+5)}-\frac{1}{5}}{x}$ =

9) $\lim_{x\to 0}$ (ln (cos(x))) =

10) $\lim_{x\to \pi/2}$ (e^x sin(x)) =

11) $\lim_{x\to 1-}$ int(x)

12) $\lim_{x->5} \frac{x^2-7x+10}{x-5}$ =

13) Use the limits $\lim_{x->3} f(x)=5$ *and* $\lim_{x->3} g(x)=-2$ to answer the following:

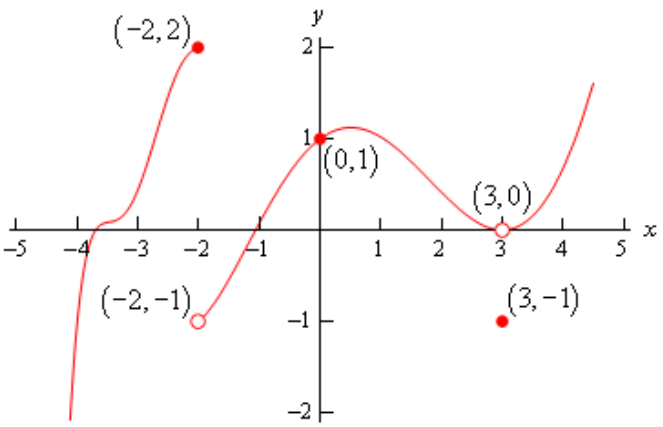
a) $\lim_{x->3} f(x)+g(x)$ =

b) $\lim_{x->3} f(x)\cdot g(x)$ =

c) $\lim_{x->3} 3f(x)-g(x)$ =

d) $\lim_{x->3} \frac{f(x)-5}{g(x)}$ =

14) Use the following diagram to answer the questions:



a) f(3) =

b) $\lim_{x\to 3^-} f(x)$ =

c) $\lim_{x\to 3^+} f(x)$ =

d) $\lim_{x\to 3} f(x)$ =

e) f(-2) =

f) $\lim_{x\to -2^-} f(x)$ =

g) $\lim_{x\to -2^+} f(x)$ =

h) $\lim_{x\to -2} f(x)$ =

i) f(0) =

j) $\lim_{x\to 0^-} f(x)$ =

k) $\lim_{x\to 0^+} f(x)$ =

l) $\lim_{x\to 0} f(x)$ =

m) $\lim_{x\to \infty} f(x)$ =

n) $\lim_{x\to -\infty} f(x)$ =

15) Given the information below, sketch a possible graph of *f(x)*.

$f(x)=0$ *at* $x=2$

$\lim_{x\to 4} f(x) = DNE$

crosses $y-axis$ *at* $y=-1$

$\lim_{x\to 2} f(x)=-1$

$\lim_{x\to 4^+} f(x)=-\infty$

$\lim_{x\to 4^-} f(x)=\infty$

a) b)

Section 2.2: Limits Involving Infinity

Find the limits below.

1) $\lim_{x\to\infty} \ln x =$

2) $\lim_{x\to-\infty} e^{-x} =$

3) $\lim_{x\to\infty} \dfrac{4x^4-5x^3}{7x^4+9x^3} =$

4) $\lim_{x\to\infty} \dfrac{3x^3-x+1}{x+3} =$

5) $\lim_{x\to-\infty} \dfrac{\sqrt{x^2-2}}{x^2+6} =$

6) $\lim_{x\to-\infty} \dfrac{1-7x^2}{x+5} =$

7) $\lim_{x\to0} \dfrac{\sin x}{5x}$

8) $\lim_{x\to0} \dfrac{3(1-\cos x)}{x}$

9) $\lim_{x\to0} \dfrac{\cos x \tan x}{x}$

10) $\lim_{x\to2} \dfrac{3x^2-7x+2}{x^2+5x-14}$

11) $\lim_{x\to0} \dfrac{x^2-4}{x+2}$

12) $\lim_{x\to\infty} \dfrac{2x+\sin x}{x}$

13) $\lim_{x\to\infty} \dfrac{x-6}{x^2+2x-48}$

14) $\lim_{x\to-\infty} \dfrac{x^3+6x}{\sqrt{x^2+5}}$

15) $\lim_{x\to-4^+} \dfrac{1}{x+4}$

16) $\lim_{x\to-\infty}\sqrt[3]{\frac{8+x^2}{8x(x+1)}}$

17) $\lim_{x\to4}\frac{\sqrt{x^2+9}+-5}{x-4}$

18) $\lim_{x\to0}\frac{\tan x}{x}$

Section 2.3: Continuity

1) Find all points of discontinuity of the functions below and state the type of discontinuity. If the function has no points of discontinuity, then specify over what intervals it is continuous.

a) $f(x)=\dfrac{x+1}{x^2-4}$

b) $f(x)=\dfrac{x^2-8x+15}{x^2-25}$

c) $f(x)=3x+9$

d) $f(x)=\sqrt{2x-7}$

e) $f(x)=\dfrac{8-2x}{x^2-16}$

f) $f(x)=\dfrac{x}{|x|-3}$

2) At what x-coordinate on $f(x)=\dfrac{x^2-x-6}{x^2-9}$ is there a removable discontinuity?

3) Find a value for *a* so that function is continuous.

a) $f(x)=\begin{cases}4-x^2, & x<-1\\ ax^2-1, & x\geq -1\end{cases}$

b) $f(x)=\begin{cases}x^2+x+a, & x<1\\ x^3, & x\geq 1\end{cases}$