AP Calculus Summer Review Packet Name_____

This packet is a review of the entering objectives for AP Calculus and is very important to your success in AP Calculus. Please try to do each problem showing the work. Our objective is to understand the concepts and not just rely on the mechanics. Bring this packet with you to AP Calculus on the first day of school.

1.) Simplify. Show the work that leads to your answer.

a.) $\dfrac{x-4}{x^2-3x-4} = \dfrac{1}{x+1}$

b.) $\dfrac{x^3-8}{x-2} = x^2+2x+4$

c.) $\dfrac{5-x}{x^2-25} = -\dfrac{1}{x+5}$

d.) $\dfrac{x^2-4x-32}{x^2-16} = \dfrac{x-8}{x-4}$

2.) Write out the following trigonometric Identities

a.) Pythagorean (There are 3!)

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

$1+\cot^2 x=1$

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

b.) (3 of these too!) $\cos 2A =$

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

$1-2\sin^2 A$

$2\cos^2 A-1$

c.) $\sin 2x = 2\sin x\cos x$

3.) Simplify each expression

a.) $\dfrac{1}{x+h}-\dfrac{1}{x} = \dfrac{-h}{x(x+h)}$

b.) $\dfrac{\frac{2}{x^2}}{\frac{10}{x^5}} = \dfrac{x^3}{5}$

c.) $\dfrac{\frac{1}{3+x}-\frac{1}{3}}{x} = -\dfrac{1}{3(3+x)}$

4.) Solve the equation for z

a.) $4x+10yz=0$ $z=\frac{-2x}{5y}$

b.) $y^2+3yz-8z-4x=0$ $z=\frac{4x-y^2}{3y-8}$

5.) Miscellaneous: Follow the directions for each problem

a.) Evaluate $\frac{f(x+h)-f(x)}{h}$ and simplify if $f(x)=x^2+2x$

$2x+h+2$

b.) Expand $(x+y)^3=x^3+3x^2y+3y^2x+y^3$

c.) Simplify $x^{\frac{3}{2}}\left(x+x^{\frac{5}{2}}-x^2\right)=x^{5/2}+x^4-x^{7/2}$

d.) Eliminate the parameter and write a rectangular equation for $x=t^2+3$, $y=2t$

$y=\sqrt{4x-12}$

6.) Expand and Simplify

a.) $\sum_{n=0}^{4}\frac{n^2}{2}=15$

b.) $\sum_{n=1}^{3}\frac{1}{n^3}=251/216$

7.) Simplify

a.) $\frac{\sqrt{x}}{x}=x^{-\frac{1}{2}}$

b.) $e^{\ln 3}=3$

c.) $e^{(x+\ln x)}=xe$

d.) $\ln 1 = 0$

e.) $\ln e^{7} = 7$

f.) $\log_{3} \frac{1}{3} = -1$

g.) $e^{3\ln x} = x^{3}$

h.) $\frac{4xy^{-2}}{12x^{-\frac{1}{3}}y^{-5}} = \frac{x^{\frac{4}{3}}y^{3}}{3}$

i.) $27^{\frac{2}{3}} = 9$

j.) $\frac{3(n+1)!}{5n!} = \frac{3n+3}{5}$

8.) Using the point-slope form $y - y_1 = m(x - x_1)$, write an equation for the line.

a.) with slope -2, containing the point (3, 4)

y = -2x+10

b.) containing the points (1, -3) and (-5, 2)

y= 5/6 x – 23/6

c.) with slope 0, containing the point (4, 2)

y = 2

d.) parallel to 2x - 3y = 7 and passes through (5, 1)

y = 2/3 x – 7/3

e.) perpendicular to the line in problem #1, containing the point (3, 4)

y = ½ x + 5/2

9.) Given the vectors $\mathbf{v} = -2\mathbf{i} + 5\mathbf{j}$ and $w = 3\mathbf{i} + 4\mathbf{j}$, determine

a.) $\frac{1}{2}\mathbf{v}$ = **-i + 5/2 j** b.) $\mathbf{w} - \mathbf{v}$ = **5i-j** c.) length of $\mathbf{w}$ = **5 units**

10.) Without a calculator, determine the exact value of each expression.

a.) $\sin 0 = 0$ b.) $\sin \frac{\pi}{2} = 1$ c.) $\sin \frac{3\pi}{4} = \frac{\sqrt{2}}{2}$ d.) $\cos \pi = -1$

e.) $\cos \frac{7\pi}{6} = -\frac{\sqrt{3}}{2}$ f.) $\cos \frac{\pi}{3} = 1/2$ g.) $\tan \frac{7\pi}{4} = -1$ h.) $\tan \frac{\pi}{6} = \frac{\sqrt{3}}{3}$

11.) For each function, determine its domain and range

a.) $y = \sqrt{x-4}$ b.) $y = \sqrt{x^2-4}$ c.) $y = \sqrt{4-x^2}$

domain: $x \geq 4$, range $y \geq 0$ domain: $x \leq -2, x \geq 2$, range: $y \geq 0$ domain: $-2 \leq x \leq 2$, range: $0 \leq y \leq 2$

12.) Determine all points of intersection

a.) $y = x^2 + 3x - 4$ and $y = 5x + 11$

x = 5 or x = -3

b.) $y = \cos x$ and $y = \sin x$ in the first quadrant.

$x = \frac{\pi}{4}$

13.) Solve for x, where x is a real number. Show the work that leads to your solution.

a.) $x^2 + 3x - 4 = 14$ b.) $(x-5)^2 = 9$ c.) $2x^2 + 5x = 8$

x = -6 or x = 3 x = 8 or x = 2 $x = \frac{-5 \pm \sqrt{89}}{4}$

d.) $(x + 3)(x – 3) > 0$

$x < -3 \text{ or } x > 3$

e.) $x^2 – 2x - 15 \leq 0$

$-3 \leq x \leq 5$

f.) $12x^2 = 3x$

$x = 0 \text{ or } x = \frac{1}{4}$

g.) $\sin 2x = \sin x, \ 0 \leq x \leq 2\pi$

$x = 0, \pi, 2\pi$

$x = \frac{\pi}{3}, \frac{5\pi}{3}$

h.) $|x – 3| < 7$

$-4 < x < 10$

i.) $(x + 1)^2(x – 2) + (x + 1)(x – 2)^2 = 0$

x=-1, x = 2, or x= ½

j.) $27^{2x} = 9^{x-3}$

x= -3/2

k.) $e^{3k} = 5$

k = ln5/3

l.) $\ln y = 2t - 3$

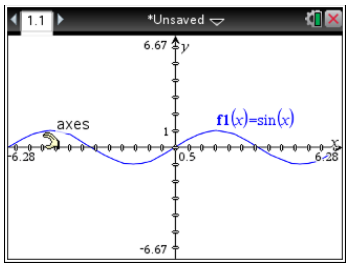
$y = e^{2t-3}$

m.) $\log x + \log(x – 3) = 1$

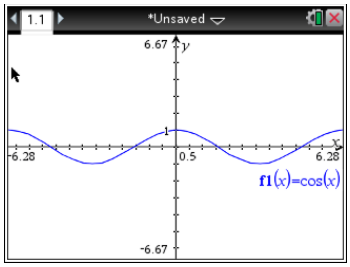
x=5 or x =-2

14.) Graph each function, give its domain and range.

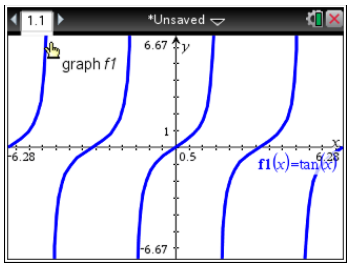
a.) $y = \sin x$



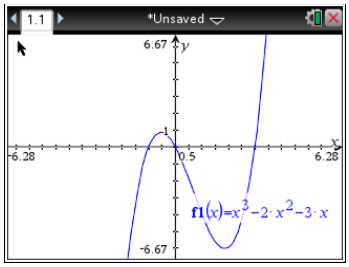
b.) $y = \cos x$

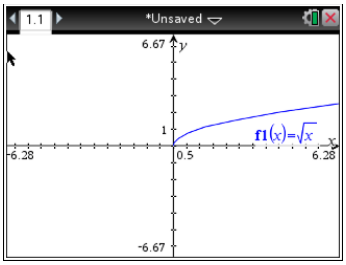


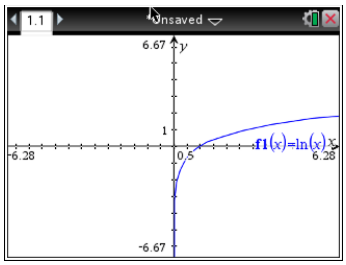
c.) $y = \tan x$



d.) $y = x^3 - 2x^2 - 3x$ b.) $y = \sqrt{x}$ c.) $y = \ln x$







15.) For each of the following - use your calculator to answer - do not show work.

1.) Graph the function on your calculator (you do not have to draw here)
2.) Find all zeros of the function to three decimal places. $-2\pi \le x \le 2\pi$
3.) Find any maximum/minimum values.

a.) $f(x) = \sin x + \ln\left(\frac{x}{2}\right)$

zeros: x = .909, 3.859, 5.082

Maximum at (2.074, .912)

b.) $f(x) = \cos(2x) - \sqrt{3} + \ln|x|$

zeros: x = ± 5.510, ± 3.710, ± 2.757

Maximum (± 3.220, .425)

Minimum (± 4.659, -1.188)
(± 1.386, -2.338)