Name: _____

Summer Review 2016
Entering Calculus Level 3

This review contains some of the key concepts from Algebra 2 and PreCalculus that you will need to recall to be successful in this course. Please look through your previous course notes and feel free to email me at Liftig.kevin@north-haven.k12.ct.us if you have any questions.

Functions

1) Given: $f(x) = x^2 - 3x$; $g(x) = 5 - 2x$; Find each of the following compositions of functions:

a) $f(g(x))$

b) $g(f(x))$

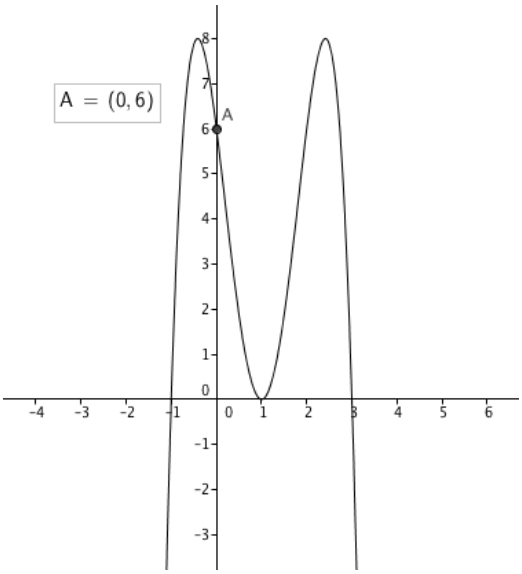
2) Given the following functions, determine whether the inverse exists. If so find $f^{-1}(x)$ and state the domain of $f^{-1}(x)$. If necessary use the horizontal line test and a graphical representation.

a) f(x) = $\frac{x-4}{x+2}$

b) $g(x) = x^3 - 5x + 2$

c) h(x) = -2ln(4x) + 5

3) Given the graph below identify the equation of the polynomial (Use the roots of the equation and y-intercept to do this), Identify the x-intercepts, note any special behavior, describe the end behavior using limit notation.



4) Draw a sketch the graph of the function $f(x) = x^3 - 6x^2 + 3x - 7$. Use interval notation to identify the intervals over which the functions is increasing and decreasing, identify the end behavior using limit notation, and label extrema(maximums and minimums), and intercepts.

Increasing Interval(s):_____

Decreasing Interval(s):_____

Right End behavior:_____

Left End behavior:_____

maximum point(s):

minimum point(s):

X-intercept(s):

Y-intercept:

5) Analyze & graph the function. Show a graph of one full standard period. You may use graph paper for your graph or can graph in the blank space.

$f(x) = 2\cos\left(x - \frac{\pi}{2}\right) + 2$ Graph:

Midline:_____

Amplitude:_____

Period length:_____

Period start:_____ period end:_____

maximum point(s):

minimum point(s):

6) Find the x-intercept(s), y-intercept(s), vertical & horizontal asymptotes, and use limit notation to describe behavior as graph approaches VAs and end behavior of each function.

x-intercept(s)_____

y-intercept(s)

g (x) = $\frac{2x}{x^2+2x-8}$

sketch graph:

Rational Functions Simplify

.1) $\frac{x^2-2x}{x^2+2x+1} \cdot \frac{x^2+4x+3}{x^2+3x}$

2) $\frac{\left(\frac{1}{x+9}+\frac{1}{5}\right)}{\left(\frac{2}{x^2+10x+9}\right)}$

Exponential & Logarithmic Functions Evaluate each logarithmic expression.

1) $\log_2 \frac{1}{8}$

2) $\log 100$

3) $\ln e^4$

4) $\log_b b$

5) $\log_5 125$

6) $\log_{\frac{1}{2}} 16$

7) $\log_4 \frac{1}{2}$

8) ln 1

Use the properties of logs to condense into an expression with a single log.

8) $2\log x + \log y - \frac{1}{2}\log z$

Use the properties of logs to expand

9) $\ln\left(\frac{10x^3y}{z^2}\right)$

Solve the equation, round to simplest form if possible or else to the nearest thousandth if necessary. Beware of extraneous solutions.

10) $8 = 2^{2x-9}$

11) $3^x \cdot 9^{x-5} = 3^{6-x}$

12) $10 + 0.1e^{3x} = 18$

13) $3\log_2(x^2 - 4) + 5 = 17$

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

Trigonometry

Find the exact trigonometric value without using a calculator.

1) $\sin \pi$

2) $\tan \frac{\pi}{2}$

3) $\cos \frac{\pi}{4}$

4) $\cos \frac{\pi}{3}$

5) $\tan \frac{\pi}{6}$

6) $\sin \frac{\pi}{6}$

7) $\sin \frac{\pi}{4}$

8) $\tan \frac{\pi}{4}$

9) $\cos \pi$

Solve each – give solutions in form indicated

10) $4 \cos^2 x - 3 = 0$ *solution within interval [0, 2π)*

11) $2\sin^2 x - \sin x - 1 = 0$ *solution within interval [0, 2π)*

Intro to Calculus concepts

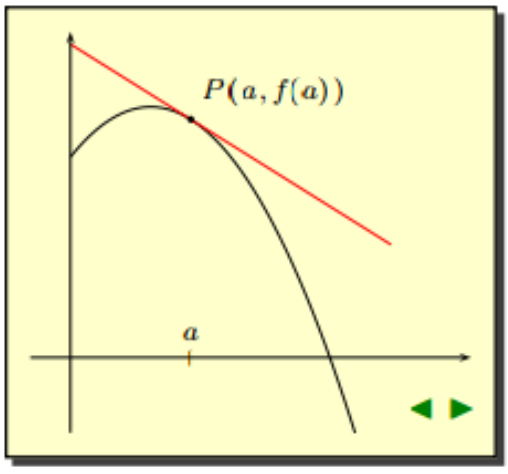
Calculus has two fundamental problems at it's core: Finding the slope of a tangent line and finding the area under a curve. We will be looking at how to find exact values for these problems throughout the year. Over the summer I would like you to try to **estimate** values for each problem using the Algebra and Geometry skills that you already know. You don't need to look up or teach yourself derivatives or integrals over the summer that is why you are taking calculus.

Given the function and value below try to estimate the slope of the line tangent to the graph at point (a, f(a)) aka (1.5, 4.75).

$f(x) = 5 - (x-1)^2$ and $a = 1.5$.

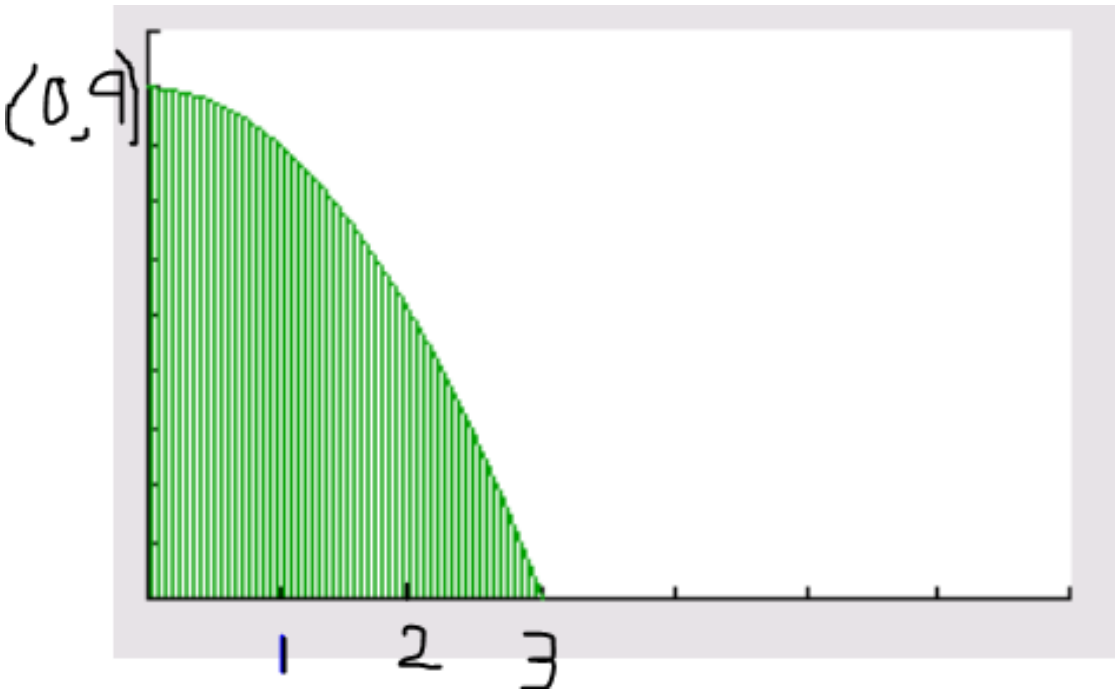
Tangent Line Problem

Problem: Given a point $P(a, f(a))$, we want to define and calculate the slope of the line tangent the graph at P.



The Area Problem

Approximate the shaded area between the function $y = -x^2 + 9$ and the x-axis.


(0,9]
1
2
3