Name: _____

Summer Review
Entering Calculus Level 3

Functions

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

a) $f(g(x))$

b) $g(f(x))$

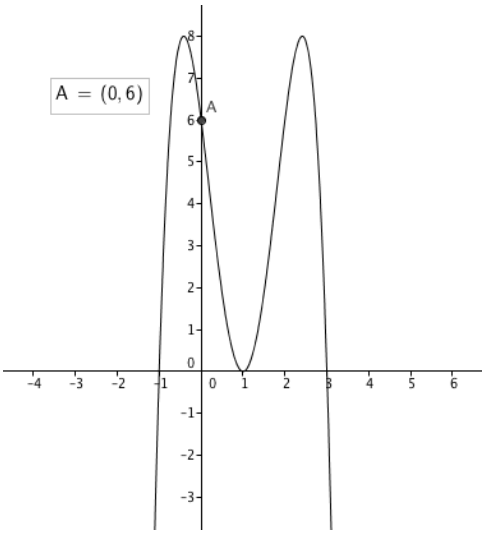
2) Given the following functions, determine whether the inverse exists. If so find $f^{-1}(x)$ and state the domain of $f^{-1}(x)$. If necessary use the horizontal line test and a graphical representation.

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) Sketch the graph of the function $f(x) = x^3 - 6x^2 + 3x - 7$. Identify domain, range, increasing/decreasing, end behavior using limit notation, extrema, and intercepts.

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.

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

x-intercept(s)_____

y-intercept(s)_____

VA _____

HA_____

Behavior approaching VAs:

sketch graph:

End behavior:

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. You should know these very well!

1) $\sin 60^o$

2) $\tan 30^o$

3) $\cos 45^o$

4) cos 60°

5) tan 30°

6) sin 30°

7) sin 45°

8) tan 45°

9) cos 30°

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)*

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Intro to Calculus concepts

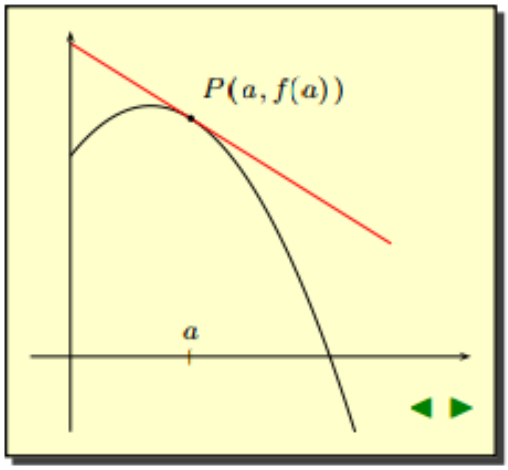
Calculus has two fundamental problems at it's core: Finding the slope of a tangent line and finding the area under a curve. We will be looking at how to find exact values for these problems throughout the year. Over the summer I would like you to try to **estimate** values for each problem using the Algebra and Geometry skills that you already know.

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.