



NORTH HAVEN HIGH SCHOOL

221 ELM STREET

NORTH HAVEN, CT 06473

Calculus Level 3 Summer Assignment 2017

June 2017

Dear Parents, Guardians, and Students:

This review contains some of the key concepts from Algebra 2 and Pre-Calculus that you will need to recall to be successful in this course. Please be sure that the completed packet is brought to school on the first day of class. The packet will be checked and students will receive a grade based on completion. There may be a quiz on the material in the packet during the first week or two of class. 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.

A Note About Graphing Calculators

Students will be using graphing calculators in mathematics courses such as Algebra I, Algebra II, Pre-calculus, Calculus, and Statistics. Each teacher has enough graphing calculators for every student to use in class, so students are not required to purchase graphing calculators. However, if a student would like to make the investment to use throughout high school and most likely college, we recommend the TI-84 Plus, which is the calculator used in class. (Please note that the TI-84 Plus CE is not necessary.) There are many sales over the summer so if you wish to purchase one it is a good time to do so. These calculators can be found at Amazon, Walmart, Staples, Target, and other stores that sell school supplies.

The mathematics department thanks you for your support and wishes you and your family a happy and restful summer!

Sincerely,

Mr. Liftig
Calculus Teacher

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Name: _____

Summer Review 2017
Entering Calculus Level 3

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) If $f(t) = t^3 - t^2 + 4t + K$ and $f(1) = 10$. Find K .

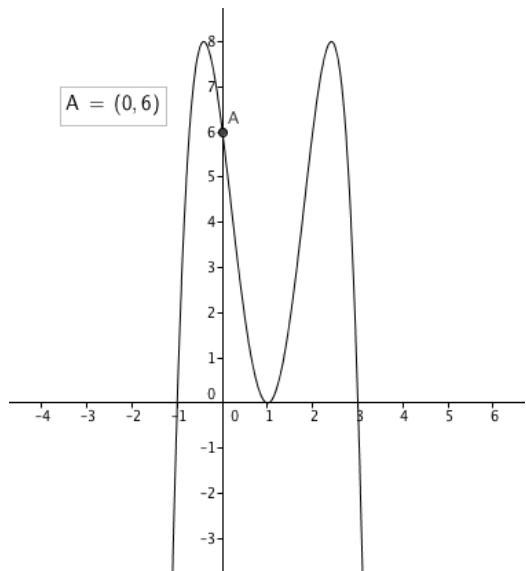
3) Given the following functions, determine whether the inverse exists. If so find $f^{-1}(x)$ and state the domain of $f^{-1}(x)$. If necessary use the horizontal line test and a graphical representation.

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

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

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

4) 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.



5) 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:

6) 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):

7) 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

$$8) \frac{x^2-2x}{x^2+2x+1} \cdot \frac{x^2+4x+3}{x^2+3x}$$

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

$$10) \frac{x^2-4}{x+2} \text{ if } x \neq -2$$

Exponential & Logarithmic Functions

Evaluate each logarithmic expression.

$$11) \log_2 \frac{1}{8}$$

$$12) \log 100$$

$$13) \ln e^4$$

$$14) \log_b b$$

$$15) \log_5 125$$

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

$$17) \log_4 \frac{1}{2}$$

$$18) \ln 1$$

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

$$19) 2 \log x + \log y - \frac{1}{2} \log z$$

Use the properties of logs to expand

$$20) \ln \left(\frac{10x^3y}{z^2} \right)$$

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

21) $8 = 2^{2x-9}$

22) $3^x \cdot 9^{x-5} = 3^{6-x}$

23) $10 + 0.1e^{3x} = 18$

24) $3\log_2(x^2 - 4) + 5 = 17$

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

Rewriting

26) Solve for D : $3x^2 + 3(xD + y) + 6y^2D = 0$

Equation writing

27) Write an equation in point slope form $y - y_1 = m(x - x_1)$ with a slope of 2 that passes through (1,5)

Trigonometry

Solve each – give solutions in form indicated

28) $4 \cos^2 x - 3 = 0$

solution within interval $[0, 2\pi)$

29) $2\sin^2 x - \sin x - 1 = 0$

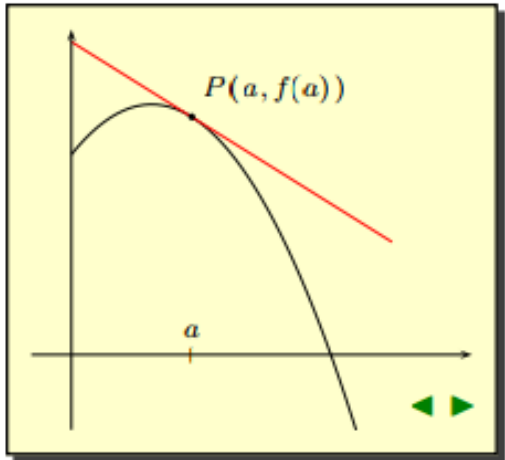
solution within interval $[0, 2\pi)$

Intro to Calculus concepts

Calculus has two fundamental problems at its 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.

$$f(x) = 64 - 16(x - 1)^2$$

If $a = 1.5$ what is the slope (Rate of change) of the line tangent to the graph at point a .



The tangent line problem is extremely tied in with looking a velocity or rate of change of an object. If it helps think of the x axis as time and the y axis as height. What would be the speed of this projectile object 1.5 seconds after it was thrown.

The Area Problem

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

