Honors Calculus Summer Assignment:

<u>Your summer assignment will be due on the first day of school.</u>

For each day late, 5 points will be deducted from the total value.

All work must be done in pencil and be done on notebook paper. All work must be shown in order to receive full credit.

Welcome to Honors Calculus!

The class is designated primarily for students who have demonstrated a strong mathematical ability in all previous math courses and are independent workers. Honors Calculus will cover the two branches of a typical Calculus course: derivatives and integrals along with associated applications. Students will have an understanding of all topics analytically, graphically, numerically, and verbally. Assessments include quizzes, tests, group work, and projects. Activities are completed throughout the year in addition to practicing problems from supplementary materials.

Prerequisites:

Before studying calculus, all students should complete courses in which they study algebra, geometry, elementary functions, and trigonometry. These functions include those that are linear, polynomial, rational, exponential, logarithmic, trigonometric, inverse trigonometric, and piecewise defined. In particular, before studying calculus, students must be familiar witht the properties of functions, the algebra of functions and the graphs of functions. Student must also understand the language of functions (domain and range, odd and even, periodic, symmetry, zeros, intercepts, etcetera) and know the values of the trigonometric functions of the numbers 0, $\pi/6$, $\pi/4$,$\pi/3$, $\pi/2$, and their multiples. This assignment will be reviewed and marked as homework but there will be a quiz based on the summer assignment material on the first week of classes (date to be determined).

Course Goals:

Students should be able to:

- Work with functions represented in a variety of ways: graphical, numerical, analytical, or verbal. They should understand the connections among these representations.
- Understand the meaning of the derivative in terms of a rate of change and local linear approximation and they should be able to use derivatives to solve a variety of problems.
- Understand the meaning of the definite integral both as a limit of Riemann sums and as the net accumulation of change and should be able to use integrals to solve a variety of problems.
- Understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.

- Model a written description of a physical situation with a function, a differential equations, or an integral.
- Understand the connections of calculus to other disciplines through use of calculus to solve physics problems as well as applications of calculus.
- Use technology to help solve problems, experiment, interpret results, and verify conclusions.
- Develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishments.

Materials:
Here are a few things you should be prepared to have - not necessarily the first day of school - but within the first week:

- 1 large 3 ring binder (1.5" or more)
    - Dividers (recommended)
- Pencils, pens, erasers, highlighters
- Notebook paper
- TI-83, TI-84, or TI-89 Calculator
- Ruler (6" is recommended)
- Laptop or Electronic Device (iPad with keyboard)

Overall, my wish is that you gain an understanding and appreciation of the concepts presented in this course and be able to step confidently into your next Calculus classrooms. As stated previously, the year must be devoted to topics in differential and integral calculus. Therefore, the summer assignments listed below are designed to help you review topics from algebra, geometry, and pre-calculus ot that when you arrive on the first day of class, you are ready to being with the first main theme in calculus: What is Calculus and Limits.

The following websites will be useful to you in completing the assignment and preparing to learn new material:

http://archives.math.utk.edu/visual.calculus/
http://www.calculus-help.com/tutorials/
http://www.centerofmath.org/videos/index.html#subject4
http://www.learningpod.com/browse/category/topic/calculus/92
https://www.khanacademy.org
http://www.chatoicgolf.com/tutorials_calc_aahs.html
You may contact me over the summer at mclark@nazarethacademyhs.org if you have any questions.

Factor.

1. $x^3 - 8$

2. $3x^2 - 5x + 2$

Calculate the zeros of each of the following.

3. $x^2 + 8x + 7 = y$

4. $y = \sqrt{2x - 6}$

5. $y = \frac{2x-4}{x+3}$

6. A business installs a wheelchair ramp that raises 22 inches over a horizontal length of 24 feet. What is the slope of the ramp? **(watch your units)**

Rationalize the denominator.

7. $\frac{2\sqrt{3}}{\sqrt{5}}$

8. $\frac{2+\sqrt{3}}{\sqrt{6}}$

9. $\frac{1}{\sqrt{5}+\sqrt{2}}$

Rationalize the numerator.

10. $\frac{2\sqrt{3}}{7}$

11. $\frac{2+\sqrt{3}}{5}$

12. $\frac{\sqrt{x+1}}{2}$

Simplify to one fraction.

13. $\frac{2}{x} + x$

14. $\frac{1}{x+1} - \frac{3}{x-1}$

15. $\frac{3x}{x^2-1} - \frac{3}{x-1}$

16. $\frac{1}{x} + \frac{3}{2x^2} + \frac{4}{x+2}$

Rewrite the fractional exponents.

17. $\sqrt{3}$

18. $2\sqrt[4]{3}$

19. $(\sqrt[3]{2x})^5$

20. $\sqrt[5]{(2x - 3)^2}$

Evaluate the following expressions. Give exact answers.

21. $sin\ \pi$

22. $cos\ \frac{\pi}{2}$

23. $tan\ \frac{\pi}{4}$

24. $csc\ \frac{\pi}{3}$

25. $cot\ \frac{-2\pi}{3}$

26. $sec\ \frac{5\pi}{6}$

27. $sin\ \frac{\pi}{6} + tan\ \frac{3\pi}{4}$

28. $csc\ -\ 3\pi$

29. Express as a single fraction.

$$\frac{\frac{3}{2(x+h)} - \frac{3}{2x}}{h}$$

30. Expand.

$$(x^{\frac{5}{2}} + \frac{3}{\sqrt{2}})^2$$

31. Solve for x.

$$x^2 - 4 = x$$

32. Find the smallest value of x that satisfies the following equation.

$$|2 - x| = 5$$

33. Write the *general* form of the equation of the line passing through the point (-2, 5) with slope $-\frac{3}{4}$.

34. Solve for p.

$$hp - 1 = q + kp + 6p$$

35. Solve for x.

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

36. Find the domain of f.

$$f(x) = \sqrt{5 - 3x}$$

37. If $cos\theta = \frac{12}{13}$ and θ is in the fourth quadrant, find $csc\theta$.

38. Simplify $(sin\theta - sin^3\theta)\ csc\theta$.

39. Write the given expression in algebraic form: $sin(arctan\frac{x}{4})$.

40. Compute arctan(-1).