Name: _____

AP Calculus AB - Summer Assignment

Period: _____

The summer assignment reflects the skills that AP Calculus AB students should have to be successful in the course. This includes retaining and applying prior knowledge as well as synthesizing old and new concepts and skills.
The assignment will be collected and graded on the first day of school. No excuses!
Please use online resources to review topics that you may have forgotten or not yet have learned.
You will need to be resourceful and independent this year! Show all work to receive full credit.

1. Find the inverse function for $f(x) = 2e^{-x}$.	2. Find the point(s) of intersection of: $$y = x + 2 \quad \text{and} \quad y^2 = 4x$$

3. A water tank has the shape of a cone (like an ice cream cone without ice cream). The tank is 10m high and has a radius of 3m at the top. If the water is 5m deep (in the middle) what is the surface area of the top of the water?

4. Solve for x: $(\ln x)^2 + 4\ln x + 4 = 0$	5. Find the general solution: $$\sin(2\theta) = \cos(\theta)$$

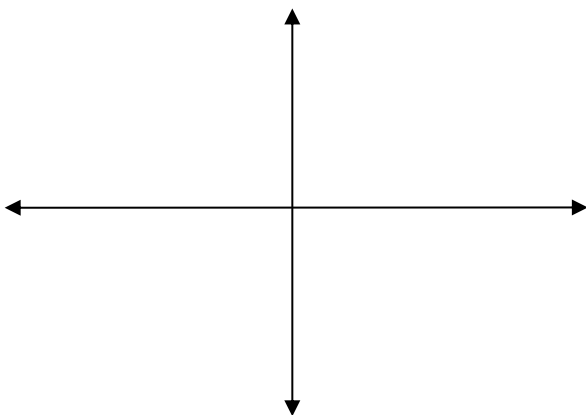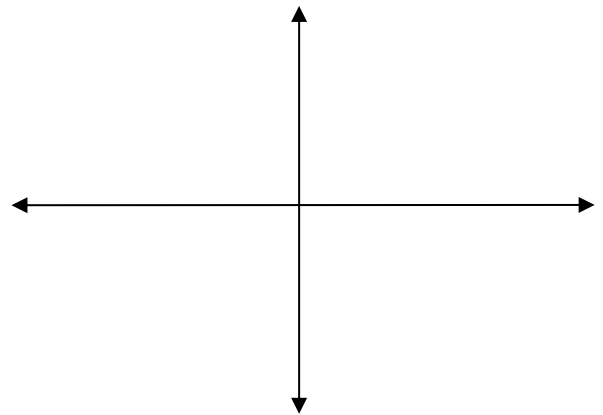|	
6. Find all solutions of $2\sec^2\theta + \tan^2\theta - 5 = 0$ on $[0, 2\pi)$.	7. Find the solution set for $\dfrac{3}{x^2-1} + 1 \ge \dfrac{2}{x-1}$. Give solution graphically and using interval notation.
8. Find the solution set for: $(3x^2 + 6x)(2x - 5) < 0$. Give solution graphically and using interval notation.	9. Solve for x: a) $9e^{3x} = 27$ b) $\ln x + \ln(x-3) = \ln 4$
10. Sketch the graph of $f(x) = |2\sin x|$. Label all intercepts.	11. Sketch the graph of the function $f(x) = |x^2 - 4|$. Label all axes and intercepts.

12. How do you prove a function is even? Odd?

How do you verify two functions are inverses?

Note: You will be assessed on the memorization of the formulas below on the first day of school.

13. Write down the following formulas.

Pythagorean Identities:

Double Angle Formulas:

$\sin 2\theta =$

$\cos 2\theta =$

$\tan 2\theta =$
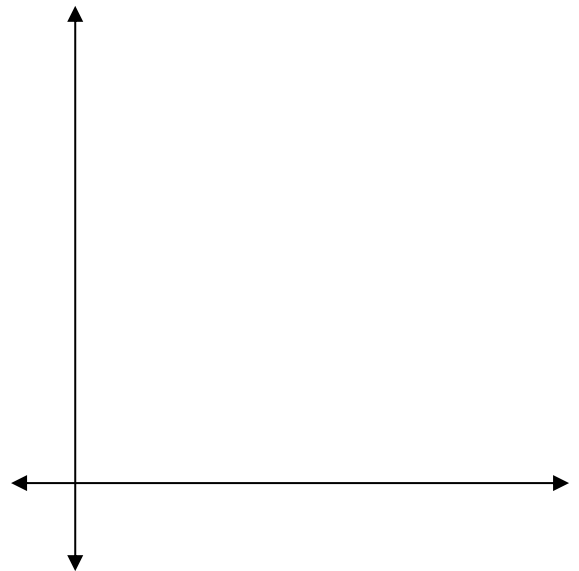
Sum and Difference Formulas:

$\sin(u \pm v) =$

$\cos(u \pm v) =$

14. The table shows the rate r (in miles per hour) that a vehicle is traveling after t seconds.

t	5	10	15	20	25	30
r	57	74	85	84	61	43

    a. Plot the data by hand and connect adjacent points with a line segment.

    b. Use the slope of each line segment to determine the intervals when the vehicle's rate changed most rapidly. How did the rate change?

Summer math help will be provided by Mu Alpha Theta (the high school math honor society) on:
Monday August 26th – Wednesday August 28th from 11 AM –2 PM
in the East Brunswick High School Media Center.

15. Use the following function for parts *a-f*. Show all work!

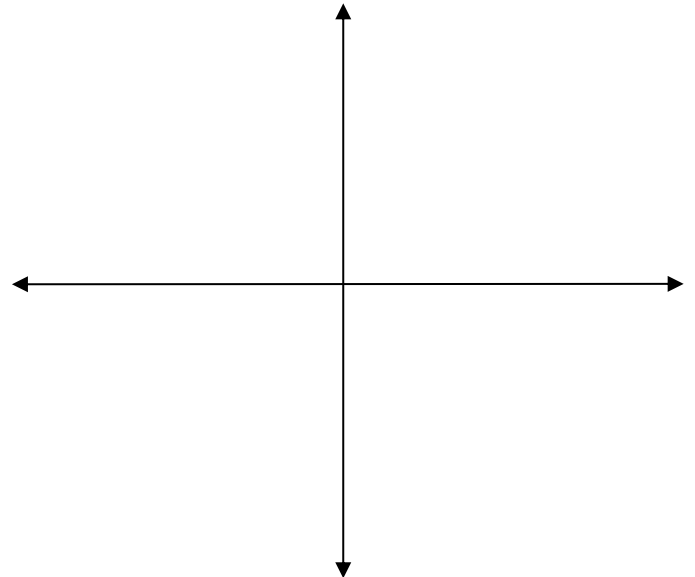$$f(x) = \frac{2x^2 - x^3}{x^3 - 3x^2 - 4x + 12}$$

|	
a. Find the zeroes.	b. Write the equation of any vertical or horizontal asymptotes.
c. State the domain of the function.	d. Describe the end behavior of the function using infinity notation and limit notation.

e. Sketch the graph of the function. Label all axes, intercepts and asymptotes.

f. Describe the continuity of the function. Identify the *x*-coordinate of any discontinuities. Explain why the function is not continuous at that point.

16. Use the function below to answer the following questions.

$y = f(x)$
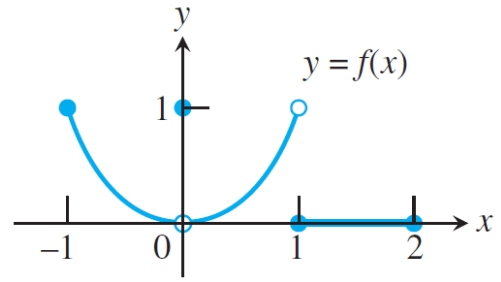
Domain: _____   Range: _____

Identify the intervals over which the function is continuous.

_____

Identify the *x*-coordinate(s) of the points of discontinuities. Describe why the function is not continuous at these point(s).

_____

_____

$f(0) =$ _____ $\lim\limits_{x \to 0^+} f(x) =$ _____ $\lim\limits_{x \to 0^-} f(x) =$ _____ $\lim\limits_{x \to 0} f(x) =$ _____

                         (approach 0 from the right)   (approach 0 from the left)

$f(1) =$ _____ $\lim\limits_{x \to 1^-} f(x) =$ _____ $\lim\limits_{x \to 1^+} f(x) =$ _____ $\lim\limits_{x \to 1} f(x) =$ _____

What conclusions can you draw about continuity? _____

_____

17. Simplify the following function.

$$f(x) = \dfrac{\dfrac{1}{x^2}(x+5) - \left(3 - \dfrac{1}{x}\right)}{(x+5)^2}$$

Visit http://www.calculus-help.com/tutorials or https://www.khanacademy.org if you have any questions on limits or continuity.