June 10, 2016

Hello 2016/2017 AP Calculus AB Students!

Ms. Braswell and Ms. Johnson would like to welcome you to the wonderful world of Advanced Placement Calculus! AP Calculus AB is a demanding course: it is the equivalent of a first year college level Calculus course! How well you do in the course is directly proportional (no pun intended) to your commitment and work ethic. We are confident that you will be up to the task!

We know you are as anxious as we are to get started. In order to get your brain warmed up for AP Calculus AB we have attached a Pre-calculus Summer Assignment Worksheet. We hope you will spend some time this summer working through this assignment, but do not stress yourself out, it is due the third week of the new school year. You may use any source, including your notes from last year, to help you with this assignment. You may also consult/work with any of your peers. You must write your solutions on separate paper, in numerical order and you must show the appropriate algebra to receive credit!

The Assignment is to be completed and submitted for a grade on Monday, Sept. 26, 2016, or Tuesday, Sept. 27, 2016.

We look forward to meeting everyone soon. Enjoy the rest of your summer vacation and always remember to:

“THINK MATH”!

Sincerely,

Ms. Braswell and Mrs. Johnson
1. Express the following as a single fraction without negative exponents.

(a) \( 3x(2x + 5)^{-0.5} + 3(2x + 5)^{0.5} \)

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

2. Multiply (Expand): \( \left(x^{0.5} + \frac{3}{\sqrt{2}}\right)^2 \)

3. Using algebra, no use of a graphing utility, find all points of intersection for the graphs of \( y = -x^2 + 4x \) and \( y = x^2 \).

4. Find the equation in standard form for the line that passes through the point \((-1, 4)\) and is perpendicular to the line \(2x + 3y = 6\).

5. If \( f(x) = 3 - x^2 \), find:

(a) \( f(3) \)

(b) \( f(k) \)

(c) \( f(2 + \Delta x) \)

6. If \( g(x) = x^2 + 3x - 1 \), find:

\[ \frac{g(x + \Delta x) - g(x)}{\Delta x} \]

7. If \( f(x) = \frac{1}{\sqrt{x}} \) and \( g(x) = x^2 - 5 \), find (a) \( f(g(x)) \) and (b) \( g(f(x)) \).

8. Use algebra, no use of a graphing utility, to find the domain of: \( f(x) = \frac{3x + 1}{\sqrt{x^2 + x - 2}} \).

9. Solve for \( p \).

(a) \( hp - 1 = q + kp + 6p \)

(b) \( 3(p + 2)^{-1} - \frac{4}{p} = 0 \)

10. Write the equation of the circle below in \((x - h)^2 + (y - k)^2 = r^2\) form and give the coordinates of the center and the length of the radius.

\[
5x^2 + 5y^2 - 20x + 10y + 21 = 0
\]

11. Use algebra, no use of a graphing utility, to solve for \( x \).

(a) \( 5^{(x+1)} = 125 \)

(b) \( \frac{1}{3} = 3^{(x+2)} \)

12. Use algebra, no use of a graphing utility, to find all real solutions to:

(a) \( x^6 - 16x^4 = 0 \) and (b) \( 8x^3 + 27 = 0 \).
13. Use algebra, no use of a graphing utility, solve for $x$. Leave your answer in exact form.

(a) \[4x^2 + 12x + 3 = 0\]  
(b) \[\frac{x + 1}{x} - \frac{x}{x + 1} = 0\]

14. Use algebra, no use of a graphing calculator, to solve for $x$.

(a) \[|5x - 2| = 8\]  
(b) \[|2x + 1| = x + 3\]

15. Use algebra, no use of a graphing calculator, to:

(a) Find the point of intersection of the lines: \[3x - y - 7 = 0\] and \[x + 5y + 8 = 5\] .

(b) Shade the solution set in the xy-plane that is described by the inequalities:
\[3x - y - 7 \leq 0\] and \[x + 5y + 8 \geq 5\] .

16. A water tank has the shape of a cone (like an ice cream cone without the 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?

17. The graph of a quadratic function (a parabola) has x-intercepts of \(-1\) and \(3\) and a range consisting of all numbers less than or equal to 4. Write an expression for the function in standard form.

18. Two cars start moving from the same point. One travels south at 100km/hour, the other west at 50km/hour. How far apart are they two hours later?

19. A kite is 100m above the ground. If there is 200m of string out, what is the angle of elevation between the string and the ground? Note: The angle of elevation is not 90 degrees.

20. Answer each of the following without a calculator.

a. \(\sin \frac{\pi}{6}\)  
b. \(\cos \frac{\pi}{2}\)  
c. \(\csc \frac{\pi}{4}\)  
d. \(\tan \frac{\pi}{6}\)  
e. \(\sin 0\)  
f. \(\sec \frac{11\pi}{6}\)  
g. \(\tan \frac{5\pi}{4}\)  
h. \(\cot \frac{4\pi}{3}\)  
i. \(\csc \pi\)  
j. \(\cos \frac{\pi}{3}\)  
k. \(\cos \pi\)  
l. \(\tan \frac{3\pi}{2}\)