Dear AP Calculus Students,

I am so excited that your curiosity, talent, and hard work in mathematics have brought you to AP Calculus AB! I look forward to being your teacher next year as you dive into a course that will open your eyes to the connections between mathematics and the real world in new and applicable ways, including modeling, manufacturing, engineering, physics, finance, and more. This course will require you to utilize and integrate all the mathematical knowledge you have acquired thus far. Therefore, it is important that you use this summer to brush up on your geometric, algebraic, and precalculus skills so that we can get off to a strong start when class begins in August.

This summer, your assignment will be two precalculus circuits: one with calculators and one without calculators. I have included detailed instructions on how to complete a circuit. If you arrive at a topic that you may need more assistance with, you can go to Khan Academy (www.khanacademy.org) and look it up. If you're not sure what to research, send me an email and I will guide you to the correct topic.

The purpose of this assignment is to help you review the skills from previous math classes that will be most applicable in calculus. **This will count as your first quick quiz grade in AP Calculus AB.** If you have any questions, please be in touch. I will check my e-mail periodically throughout the summer. I am so excited and looking forward to a great upcoming year of AP Calculus with you!

Sincerely,

Mrs. Nicole Snyder

nsnyder@williamandreed.com

How to work a circuit

1. Start in the top left box that is already numbered question #1
2. Answer the question
   "Factor the GFC: $24a^2b^3 - 56ab^2$"

   Once you have the answer $8ab^2(3ab-7)$, look through the worksheet for <u>one</u> of the two factors (per the directions)
3. This now becomes problem #2. Fill 2 in on the # ______
4. Repeat the process. Question #2 says, "factor the trinomial $a^2 - 10a + 21$ so that is the product of two binomials".

$$a^2 - 10a + 21$$
$$(a-7)(a-3)$$

5. This now becomes problem #3. Fill 3 in on the # _______
6. Repeat the process until your last answer takes you back to the first box. If you have done them all correctly, you will have used them all when you are complete.

Circuit Training – Factoring (Mixed, Intermediate) **Name** ____________________

<u>Directions</u>: Begin in cell #1. Factor the expression, then search for *one* of your factors. When you find it, call that problem #2 and continue in this manner until you complete the circuit. You may need to attach additional sheets of paper to showcase your best work.

Answer: ________________ # __1__ Factor the GCF: $24a^2b^3 - 56ab^2$	Answer: 2 # _____ If $m = -8$, then there is a unique solution to the equation $x^2 + mx + 16 = 0$. What other value of m yields just one solution?
Answer: $a - 4$ # _____ Factor: $49a^2 + 25b^2$	Answer: $a - 5$ # _____ Factor: $49a^2 - 9b^2$
Answer: $a - 3$ # __3__ Factor by grouping: $ab + 7b + 3a + 21$	Answer: $a^2 - 4a + 16$ # _____ The equation $s(t) = -5t^2 + 3t + 2$ gives the height, $s(t)$, in meters, of a diver at any time t, in seconds, where $t \geq 0$. When does the diver hit the water?
Answer: $4a - 5$ # _____ Use factoring to solve the equation $x^2 - 2x - 3 = 0$. What is the sum of the solutions?	Answer: $a^2 - 5a + 25$ # _____ Factor: $9a^2 - 25b^2$
Answer: $5(a - 1)$ # _____ Simplify: $\frac{a^2-9}{a^2+5a+6}$ for $a > -2$.	Answer: $a + 8$ # _____ Factor: $49a^2 - 14a + 1$
Answer: $3ab - 7$ # __2__ Factor the trinomial $a^2 - 10a + 21$ so that it is the product of two binomials.	Answer: $a - 2$ # _____ Factor: $a^3 - 3a^2 + 5a - 15$

*** For several of the problems you will have to do some simplifying or algebraic manipulation to make it match the answer that is given. ***

Even if you get stuck and can't make the circuit work, you can still do the problems. We will be using circuits regularly.

Circuit Training – Precal / Trig Review **NO CALCULATOR!** ☺ Name ______________________

Directions: Beginning in cell #1, read the question and show the work necessary to answer it (attach separate sheets if necessary). Search for your answer and call that cell #2. Continue in this manner until you complete the circuit. Note: The last question will not have a match!

# 1 Find the slope of the line which connects the point (b, 3b) to the point (3b, 6b). [Note: b≠0.]	Answer: $\frac{-1+ln3}{2}$ # _____ The graph of y = 2 sin(3x - $\frac{\pi}{2}$) has an amplitude of _____, a period of _____, and a phase shift of _____ to the _________ (left/right) when compared to the graph of y = sinx.
Answer: $\frac{2e}{1-e}$ # _____ As x grows infinitely large, the value of $h(x) = \frac{2x}{5x+8}$ approaches what number?	Answer: 4/5 # _____ Find the average rate of change of $w(x) = 3x^2 + 1$ over the interval [-1, 4].
Answer: 75 # _____ For $\frac{\pi}{2} \leq A \leq \pi$, $sinA = \frac{3}{5}$. Find $\sin(2A)$.	Answer: 9 # _____ If $f(x) = lnx$ and $g(x) = e^{x+1}$, find $f(g(2)) - g(f(e))$.
Answer: 21 # _____ $f(x) = g^{-1}(x)$ and $g(x) = \frac{2x}{x-1}$; $f(5) = ?$	Answer: $(-\infty, 2) \cup (2, \infty)$ # _____ $log_{10}25 + log_{10}4 =$
Answer: [-2, 2] # _____ Solve for x: $e^{2x+1} - 3 = 0$	Answer: x = -3 # _____ State the domain of $y = \ln(x-2)$.
Answer: 2/5 # _____ The expression $3x^2$ is used to calculate the slope at any point on the graph of the function $g(x) = x^3 - 1$. Write the equation of the line tangent to g(x) at its x-intercept.	Answer: 3/2 # _____ The linear function f(x) is parallel to the line $y = \frac{4}{5}x - 7$ and passes through the point (-5, 0). What is f(-6)?

Answer: -4/5 # _____ The quadratic function g(x) has a vertex at (-5, 0) and y-intercept of (0, -5). What is g(1)?	Answer: 2 # _____ The graph of $g(x) = -\sqrt{4-x^2}$ is a semicircle in quadrants III and IV. Find the domain of $g(x)$.
Answer: 4 # _____ Simplify the expression $\frac{x^3+125}{x+5}$ and then evaluate the resulting expression for x = -5.	Answer: 26 # _____ Find $x^2 - y^2$ given that x + y = 7 and x – y = 3.
Answer: $3 - e^2$ # _____ Given $f(x) = x^2 + 5$, find $\frac{f(3+h)-f(3)}{h}$ $(h \neq 0)$.	Answer: 36 # _____ State the range of $w(x) = \frac{2x+1}{x+3}$.
Answer: x > 2 # _____ $81^{\frac{3}{4}} + 8^{\frac{2}{3}} + 125^{\frac{1}{3}}$	Answer: -24/25 # _____ The graphs of $g(x) = \ln(x+3)$ and $f(x) = \frac{2x+1}{x+3}$ have the same vertical asymptote. What is it?
Answer: 5/3 # _____ Solve for x: $\ln(x) - \ln(x+2) = 1$	Answer: y = 3x – 3 # _____ Evaluate g(x) = 5sinx + cos(2x) for x = $\frac{\pi}{2}$.
Answer: -36/5 # _____ Find the average rate of change of the function $p(x) = \frac{4}{5}x - 2$ from x=0 to x=15.	Answer: 6 + h # _____ If the perimeter of a rectangle is 68 and the width is 10, find the length of a diagonal.

Circuit Training – Precalculus /Trig Review **CALCULATOR ACTIVE** Name ___________________________

Beginning in cell #1, use a combination of analytic methods and a graphing calculator to solve the problem. Show how you arrived at your answer, even if a lot of your work was done on the calculator. Hunt for your answer and call this problem #2. Continue in this manner until you complete the circuit. Note: Answers are rounded or truncated to three decimal places. Also, make sure you know HOW to do these on the test when there are no answer choices!

Answer: 0.510 #1 Find the average rate of change for the function $f(x) = 3e^{-x}$ from $x = -1$ to $= 7$.	Answer: 1.771 # _____ The function $r(x) = \frac{x+2}{2x-3}$ has a horizontal asymptote of y = _______.
Answer: -1.750 # _____ Find $f(g\left(-\frac{4\pi}{7}\right))$ if $f(x) = \begin{cases} \lvert x\rvert - 2, & x \le 0 \\ \frac{3}{x}, & x > 0 \end{cases}$ and $g(x) = \tan x$.	Answer: 5.832 # _____ Find the zero of $f(x) = 3 - 2^x$.
Answer: 1.585 # _____ Suppose the number of cases of a rare disease is able to be reduced by 25% annually. If there are 4000 cases nationwide, how many years will it take to reduce the number of cases to 300 ?	Answer: 1.500 # _____ The graph of an exponential function, $y = a \cdot b^x$, passes through the points $(1, 1)$ and $(2, 3.5)$. Find the value of a.
Answer: 0.500 # _____ If $f(g(x)) = g(f(x)) = x$, and $g(x) = 2 + \ln(x+1)$, find $f(4)$.	Answer: 9.899 # _____ A cone has a height which is one-sixth the radius. If the radius is two, what is the volume of the cone?
Answer: 1.396 # _____ $g(x) = \ln(x-4)$ and $f(x) = \frac{1}{2}x^2 + 3$. Find $f(g(6))$.	Answer: 0.685 # _____ A drug is administered intravenously for eight hours, $0 \le t \le 8$, and the function $f(t) = 32 - 8.2\ln(1+2t)$ gives the number of units of the drug in the body after t hours. How many units are present after 7 hours (at time $t = 7$)?

Answer: 9.004 # ______ What is the period of $y = \sin(4x)$?	Answer: -1.019 # ______ For $g(x) = -3x^2 + 5.2x + 7$, find the maximum value of the function.
Answer: 1.760 # ______ Solve for θ, $\frac{3\pi}{2} \leq \theta \leq 2\pi$. $cos\theta = 0.9$	Answer: 0.456 # ______ What is the minimum value of $y = -3\cos t + 1.25$?
Answer: 9.794 # ______ The function $v(t) = -9.8t + 5$ gives the instantaneous velocity (in m/sec) of an object thrown upward with an initial velocity of 5 m/sec. At what time t does the object start falling?	Answer: 3.240 # ______ Solve the non-linear system $\begin{cases} y = \sqrt{x+2} \\ y = 1.1x^5 \end{cases}$. To advance in the circuit, locate the y-coordinate of the solution.
Answer: 9.253 # ______ An isosceles right triangle has a leg of 7 cm. What is the length of the hypotenuse, in cm?	Answer: 6.389 # ______ Solve $\sec(3x) = 5$ on the open interval $\left(0, \frac{\pi}{6}\right)$.
Answer: 0.286 # ______ $log_3 7$ = ?	Answer: 1.571 # ______ The function $f(x) = \frac{x+2}{2x-3}$ has a vertical asymptote at x = ________.