

AP Calculus Summer Assignment:

As you prepare to enter AP Calculus in the fall, there are certain skills you have learned over the years that are essential to developing a solid understanding of calculus. If you do not have these skills, you will find that you will consistently make mistakes in your work even though you understand the Calculus concepts. It can be very frustrating for students when they are tripped up by the algebra and not the calculus. This summer assignment is intended to help you brush up and possibly relearn these topics.

If you have not yet done so, please join the AP Calculus Google Classroom page.

Join Code: w3lc6ma

Instructions:

- Print the attached 4 pages. If you do not have access to a printer, let me know and I will mail you a hard copy of the assignment.
- The assignment is 2 “Circuits” which means that you begin with the first problem. Once you answer the problem, you will look for that answer somewhere on the pages. Where you find the answer, you will mark that problem #2 then find the answer for that one and label it #3 and so on. This format allows for self-checking as you go through the problems. No answer is used more than one time.
- The first circuit should be done without a calculator. The second expects the use of a calculator. Over half of your AP exam for Calculus next year will not allow the use of a calculator. The other portion expects that you know how to use one, so both parts are equally important.
- You must show appropriate work for every problem. Attach separate pages where needed, and number your work neatly. (You may need to re-number if you make mistakes as you move through the circuit.)
- Do the problems with the idea of making sure you understand the concepts rather than just getting answers and credit. Your work in calculus will be much less frustrating if you have a solid foundation in precalculus concepts.
- If you need to be refreshed in your understanding of any particular topic, I have included some helpful websites below that you can use for reference.

This assignment is due on the first day of school in August. We will discuss and correct them during the first week of school, and then you will be tested for mastery of these. Wait until about the last two weeks of summer to get started so that the topics are still fresh on your mind when we begin in August.

Web resources for reference if you need a refresher on something:

<https://www.khanacademy.org/signup>

<http://www.coolmath.com/precalculus-review-calculus-intro>

<http://www.purplemath.com/modules/index.htm>

<http://www.mathematicshelpcentral.com/index.html>



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!

<p># 1 Find the slope of the line which connects the point $(b, 3b)$ to the point $(3b, 6b)$. [Note: $b \neq 0$.]</p>	<p>Answer: $\frac{-1+\ln 3}{2}$ # _____ 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 $y = \sin x$.</p>
<p>Answer: $\frac{2e}{1-e}$ # _____ As x grows infinitely large, the value of $h(x) = \frac{2x}{5x+8}$ approaches what number?</p>	<p>Answer: $4/5$ # _____ Find the average rate of change of $w(x) = 3x^2 + 1$ over the interval $[-1, 4]$.</p>
<p>Answer: 75 # _____ For $\frac{\pi}{2} \leq A \leq \pi$, $\sin A = \frac{3}{5}$. Find $\sin(2A)$.</p>	<p>Answer: 9 # _____ If $f(x) = \ln x$ and $g(x) = e^{x+1}$, find $f(g(2)) - g(f(e))$.</p>
<p>Answer: 21 # _____ $f(x) = g^{-1}(x)$ and $g(x) = \frac{2x}{x-1}$; $f(5) = ?$</p>	<p>Answer: $(-\infty, 2) \cup (2, \infty)$ # _____ $\log_{10} 25 + \log_{10} 4 =$</p>
<p>Answer: $[-2, 2]$ # _____ Solve for x: $e^{2x+1} - 3 = 0$</p>	<p>Answer: $x = -3$ # _____ State the domain of $y = \ln(x - 2)$.</p>
<p>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.</p>	<p>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 $f(-6)$?</p>

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

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!

<p>Answer: 0.510 #1 Find the average rate of change for the function $f(x) = 3e^{-x}$ from $x = -1$ to $x = 7$.</p>	<p>Answer: 1.771 # _____ The function $r(x) = \frac{x+2}{2x-3}$ has a horizontal asymptote of $y =$ _____.</p>
<p>Answer: -1.750 # _____ Find $f(g(-\frac{4\pi}{7}))$ if $f(x) = \begin{cases} x - 2, & x \leq 0 \\ \frac{3}{x}, & x > 0 \end{cases}$ and $g(x) = \tan x$.</p>	<p>Answer: 5.832 # _____ Find the zero of $f(x) = 3 - 2^x$.</p>
<p>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?</p>	<p>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.</p>
<p>Answer: 0.500 # _____ If $f(g(x)) = g(f(x)) = x$, and $g(x) = 2 + \ln(x + 1)$, find $f(4)$.</p>	<p>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?</p>
<p>Answer: 1.396 # _____ $g(x) = \ln(x - 4)$ and $f(x) = \frac{1}{2}x^2 + 3$. Find $f(g(6))$.</p>	<p>Answer: 0.685 # _____ A drug is administered intravenously for eight hours, $0 \leq t \leq 8$, 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 $t = 7$)?</p>

<p>Answer: 9.004 # _____ What is the period of $y = \sin(4x)$?</p>	<p>Answer: -1.019 # _____ For $g(x) = -3x^2 + 5.2x + 7$, find the maximum value of the function.</p>
<p>Answer: 1.760 # _____ Solve for θ, $\frac{3\pi}{2} \leq \theta \leq 2\pi$. $\cos\theta = 0.9$</p>	<p>Answer: 0.456 # _____ What is the minimum value of $y = -3\cos t + 1.25$?</p>
<p>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?</p>	<p>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.</p>
<p>Answer: 9.253 # _____ An isosceles right triangle has a leg of 7 cm. What is the length of the hypotenuse, in cm?</p>	<p>Answer: 6.389 # _____ Solve $\sec(3x) = 5$ on the open interval $(0, \frac{\pi}{6})$.</p>
<p>Answer: 0.286 # _____ $\log_3 7 = ?$</p>	<p>Answer: 1.571 # _____ The function $f(x) = \frac{x+2}{2x-3}$ has a vertical asymptote at $x = \underline{\hspace{2cm}}$.</p>