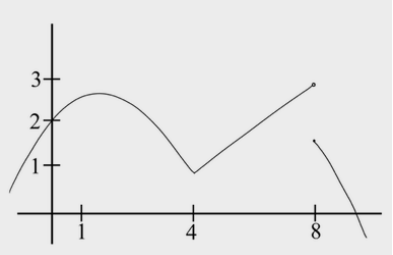



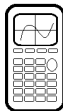
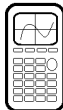
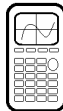
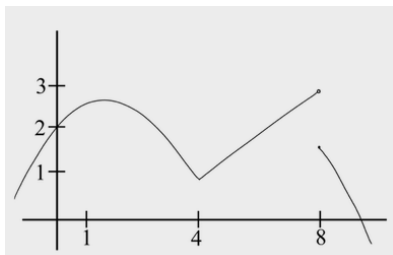
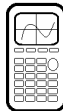
**Directions:** Begin in cell #1. Do the work necessary to solve the problem. Search for your answer. Call the cell #2 and proceed in this manner until you complete the circuit. In some cases, you will have to attach separate paper to showcase your best work. *If you see the icon you may use a calculator, though you may not need to.* If the problem refers to a **TABLE**, use the table below. Otherwise, each problem uses only the given information in its cell.

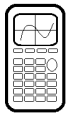
Select function values and first derivative values of the twice differentiable functions  $f$  and  $g$  are shown.

$x$	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
0	3	-2	1/2	3
1	4	-4	1/4	1/3
2	5	-8	1/8	-5

<p style="text-align: right;">Answer: <math>\frac{7}{9}</math></p> <p># <u>1</u> <math>\lim_{x \rightarrow -6} \frac{2x^2 + 12x}{x + 6}</math></p>	<p style="text-align: right;">Answer: 2</p> <p># _____ <math>\lim_{x \rightarrow -\infty} \frac{\sqrt{ax^2 + bx + c}}{d - ax} = 2</math> if <math>a = ?</math></p>
<p style="text-align: right;">Answer: 17</p> <p># _____ Where does the function appear to be continuous but not differentiable?</p> <div style="text-align: center;">  </div>	<p style="text-align: right;">Answer: <math>-\infty</math></p> <p># _____ For piecewise function, <math>f(x)</math>, consider the statement <math>\lim_{x \rightarrow 6^-} f(x) = \lim_{x \rightarrow 6^+} f(x) = f(6)</math>.</p> $f(x) = \begin{cases} \frac{1}{6}x - 4, & x < 6 \\ -\frac{x}{2}, & x = 6 \\ 3 - x, & x > 6 \end{cases}$ <p>If TRUE, go to answer - 3, if FALSE, go to answer - 2.</p>
<p style="text-align: right;">Answer: -12</p> <p># _____ Evaluate the limit: <math>\lim_{x \rightarrow 0} \frac{\sqrt{x+36} - 6}{x}</math></p>	<p style="text-align: right;">Answer: 1</p> <p># _____ Evaluate the limit: <math>\lim_{x \rightarrow \frac{\pi}{4}} \frac{\tan x - 1}{x - \frac{\pi}{4}}</math></p>

<p style="text-align: right;">Answer: <math>-2</math></p> <p># _____ Given <math>y = e^{x-e} + \ln x - \frac{x}{e}</math>; <math>y'(e) = ?</math></p>	<p style="text-align: right;">Answer: <math>-\frac{24}{25}</math></p> <p># _____ <math>y = \tan^{-1}(3x)</math> <math>y'(1) = ?</math></p>
<p style="text-align: right;">Answer: <math>-\frac{63}{2}</math></p> <p># _____ . <b>TABLE</b> <math>\lim_{x \rightarrow 2} \frac{3f(x) - 15}{x - 2} = ?</math></p>	<p style="text-align: right;">Answer: <math>\frac{1}{12}</math></p> <p># _____ <math>\lim_{x \rightarrow 6^-} \frac{2x}{x^2 - 36} = ?</math></p>
<p style="text-align: right;">Answer: <math>-3</math></p> <p># _____ Find the instantaneous rate of change of the function <math>h(x) = \frac{2}{3}x^3 - 4x^2 + 7x + 1</math> at <math>x = -1</math>.</p>	<p style="text-align: right;">Answer: <math>7</math></p> <p># _____ <b>TABLE</b> <math>w(x) = 3f(x)g(x)</math> <math>w'(0) = ?</math></p>
<p style="text-align: right;">Answer: <math>-\frac{3}{4}</math></p> <p># _____</p> <p>Where do the graphs of <math>y = e^{\frac{x}{2}}</math> and <math>y = -x^2 + 2x + 1</math> have parallel tangents?</p> 	<p style="text-align: right;">Answer: <math>8</math></p> <p># _____ Evaluate <math>\frac{dy}{dx}</math> at the second quadrant point where <math>x = -1</math> for the relation <math>x^3 - x^2y + y^2 = 11</math>.</p>

<p style="text-align: right;">Answer: <math>-\frac{1}{3}</math></p> <p># _____ Find <math>\frac{d^2y}{dx^2}</math> at <math>x = -3</math> for <math>y = \frac{x+5}{x-2}</math>.</p>	<p style="text-align: right;">Answer: 4</p> <p># _____ What is the slope of the tangent line to <math>y = 2 \sin x</math> at <math>x = \pi</math>?</p>
<p style="text-align: right;">Answer: 0.653</p> <p># _____ What is the 47<sup>th</sup> derivative of <math>y = \sin x</math> evaluated at <math>x = \frac{\pi}{3}</math>?</p> 	<p style="text-align: right;">Answer: <math>\frac{1}{4}</math></p> <p># _____ The equation of the tangent line to <math>y = \sqrt[3]{x}</math> at <math>x = 8</math> is <math>y = ax + b</math>. What is <math>b</math>?</p>
<p style="text-align: right;">Answer: <math>\frac{3}{8}</math></p> <p># _____ Where is the tangent line to <math>y = \frac{\csc^2(\frac{x}{2})}{3x+4}</math> horizontal on the interval <math>0 \leq x \leq 2\pi</math>?</p> 	<p style="text-align: right;">Answer: <math>\frac{5}{2}</math></p> <p># _____ Let <math>R(t)</math> be the rate, in gallons per hour, at which water enters a tank. What are the units of <math>R'(t)</math>?</p>  <p>gallons.....go to.....answer.....<math>-\frac{1}{2}</math>  gallons/hour.....go to.....answer....0.653  gallons<sup>2</sup>/hour.....go to.....answer.....<math>\frac{3}{8}</math>  gallons/hour<sup>2</sup>.....go to.....answer.....<math>-\frac{3}{4}</math></p>
<p style="text-align: right;">Answer: <math>\sqrt{\frac{13}{3}}</math></p> <p># _____ Assume the graph is <math>p(x)</math>.</p> $\lim_{x \rightarrow 8^-} \frac{3p(x) - 2x}{15 - 3x} = ?$ 	<p style="text-align: right;">Answer: <math>-\frac{1}{2}</math></p> <p># _____ <b>TABLE</b>  Write the equation of the tangent line to <math>g(x)</math> at <math>x = 1</math> and use it to approximate <math>g(0.8)</math>.</p> 

<p style="text-align: right;">Answer: <math>\frac{4}{3}</math></p> <p># _____ <b>TABLE</b>  <math>h(x) = 16f(x) - g(x) \quad h'(2) = ?</math></p>	<p style="text-align: right;">Answer: <math>-\frac{14}{125}</math></p> <p># _____ <b>TABLE</b>  <math>p(x) = \sqrt{f(x)} \quad p'(1) = ?</math></p>
<p style="text-align: right;">Answer: <math>\frac{3}{10}</math></p> <p># _____ <b>TABLE</b>  Let <math>f^{-1}(x)</math> be the inverse of <math>f(x)</math>. Find <math>(f^{-1})'(5)</math>.</p>	<p style="text-align: right;">Answer: <math>-\frac{1}{8}</math></p> <p># _____ <b>TABLE</b>  <math>m(x) = \frac{g(x)}{f(x)} \quad m'(2) = ?</math></p>
<p style="text-align: right;">Answer: <math>-\frac{11}{7}</math></p> <p># _____ The velocity of a particle moving horizontally along the <math>x</math>-axis is given by <math>v(t) = t \sin^3(5t)</math> for <math>t \geq 0</math>. At <math>t = 2</math> is the particle speeding up or slowing down? Explain.</p>  <p>Speeding up .... go to.... answer <math>\frac{3}{2}</math>.  Slowing down.... go to answer <math>\frac{5}{2}</math>.</p>	<p style="text-align: right;">Answer: 24</p> <p># _____ <b>TABLE</b>  For some value of <math>x = c, 0 &lt; c &lt; 2, g(c) = -\pi</math>.  What condition(s) must be met for the proof?  Continuity..... go to ..... answer <math>-\frac{1}{3}</math>.  Differentiability..... go to ..... answer <math>-\frac{1}{4}</math>.  Differentiability and continuity.. go to.. answer <math>-\frac{24}{25}</math>.</p>
<p style="text-align: right;">Answer: <math>-4.066</math></p> <p># _____ Let <math>z = \frac{xy}{2}</math>. If <math>\frac{dz}{dt} = -12</math> and <math>\frac{dx}{dt} = 3</math> when <math>z = 4</math> and <math>y = 6</math>, find <math>\frac{dy}{dt}</math>.</p>	<p style="text-align: right;">Answer: <math>\frac{1}{16}</math></p> <p># _____ Use the data in the <b>TABLE</b> to estimate <math>f''(1.5)</math>.</p>
<p style="text-align: right;">Answer: 3.545</p> <p># _____ Given <math>h(x) = x^3 - x</math>. Determine <math>c, 1 &lt; c &lt; 3</math>, for which <math>h'(c) = \frac{h(3) - h(1)}{3 - 1}</math>.</p>	<p style="text-align: right;">Answer: <math>\frac{3}{2}</math></p> <p># _____ <math>\frac{dh}{dt} = -\sqrt{5h}</math> Determine <math>\frac{d^2h}{dt^2}</math> at <math>h = 16</math>.</p>