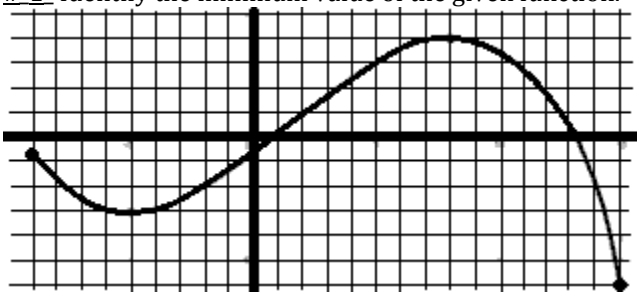
Mobius - Circuit with a twist – Related Rate/First and Second Derivatives Name_____

Directions: Beginning in the first cell marked #1, find the requested information. To advance in the circuit, hunt for your answer and mark that cell #2. Continue working in this manner until you complete the circuit. Then verify your results by picking one of the remaining cells. The remaining cells (there will be 2, 3, 4, or 5 cells) will complete a second circuit.

Ans: 3.5809 #_1_ Identify the minimum value of the given function. 	Ans: 27 #____ A spherical balloon is being filled with a gas at a rate of 12 cubic feet per minute. Find the rate of change of its surface area, A, when the radius is 5 feet long. What is the value in feet/min of $\frac{dr}{dt}$?
Ans: -4 #____ A spherical balloon is being filled with a gas at a rate of 12 cubic feet per minute. Find the rate of change of its surface area, A, when the radius is 5 feet long. What is the value in square feet/min of $\frac{dA}{dt}$?	Ans: -6 #____ Find both critical numbers. Identify the leftmost critical number. $f(x) = x^3 + 6x^2 - 15x + 18$
Ans: 1.1905 #____A conical pile of sand is being added to at a rate of 15 cubic yards per hour. The sand is piling in such a way that the diameter of the pile is always twice its height. Find the rate of change of the height in ft/hour when the pile is 6' high. Find the value (in cubic ft/hour) of $\frac{dV}{dt}$.	Ans: 2 #____Apply the Mean Value Theorem to the function on the interval $[0, 2]$. Find the value of x where the guaranteed value of the derivative occurs. $f(x) = 3 + 12x^2 - x^3$.
Ans: $\frac{3}{25\pi}$ #____A particle is moving along the given curve with $\frac{dy}{dt} = \frac{1}{4}$. $y = \sqrt[3]{x}$. Find $\frac{dx}{dt}$ when $x = 2$.	Ans: -3 #____A particle is moving along the given curve with $\frac{dy}{dt} = -6$. $x^2 + y^2 = 25$. Find $\frac{dx}{dt}$ when $x = 3$ and $y = 4$.

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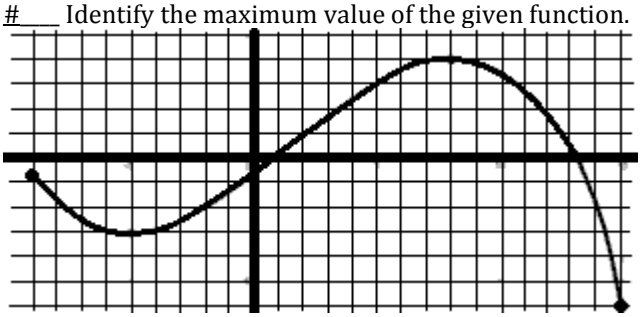
Ans: -8 #___ $f(x) = 3x^4 - 8x^3 - 96x^2 + 384x - 110$. On the interval $[-5, 4]$ identify the value of x where the absolute maximum occurs.	Ans: 12 #___ $y = x^4 - 10x^3 - 12kx^2 + 4x - 7$ has a point of inflection at $x = 2$. Find the value of k.
Ans: $\frac{24}{5}$ #___ Find both critical numbers on the interval $[0, \pi]$. Identify the leftmost critical number on the interval. $f(x) = 3\cos(\frac{4}{3}x) + 2x$	Ans: 0.9449 #___ Identify the maximum value of the given function. 
Ans: 4 #___ $y = x^3 - 6x^2 + 2x + 4$ has exactly one point of inflection. Find the y-coordinate of the point of inflection.	Ans: 8 #___ A conical pile of sand is being added to at a rate of 15 cubic yards per hour. The sand is piling in such a way that the diameter of the pile is always twice its height. Find the rate of change of the height in ft/hour when the pile is 6' high. Convert cubic yards to cubic feet. 1 cubic yard = ? cubic feet
Ans: 405 #___ $f(x) = 3x^4 - 8x^3 - 96x^2 + 384x - 110$. On the interval $[-5, 4]$ identify the value of x where the absolute minimum occurs.	Ans: $\frac{\pi}{8}$ #___ A conical pile of sand is being added to at a rate of 15 cubic yards per hour. The sand is piling in such a way that the diameter of the pile is always twice its height. Find the rate of change of the height in ft/hour when the pile is 6' high. What is the value in feet/hour of $\frac{dh}{dt}$?
Ans: 20 #___ A spherical balloon is being filled with a gas at a rate of 12 cubic feet per minute. Find the rate of change of its surface area, A, when the radius is 5 feet long. What is the value (omitting units) of $\frac{dV}{dt}$?	Ans: -5 #___ Apply the Mean Value Theorem to the function on the interval $[0, 2]$. What is the average rate of change that is guaranteed by the theorem? $f(x) = 3 + 12x^2 - x^3$.

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