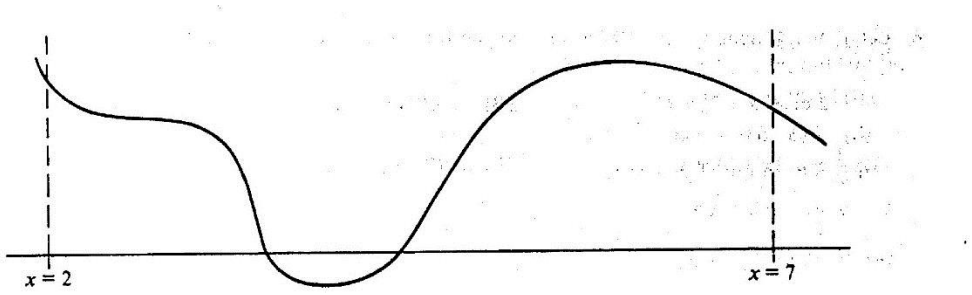
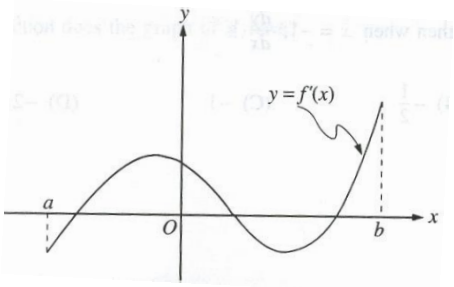
CALCULUS FINAL EXAM REVIEW CHAPTER 8



1. The graph of $y = f(x)$ on closed interval [2, 7] is shown above. How many points of inflection does this graph have on this interval?

(A.) One (B.) Two (C.) Three (D.) Four (E.) Five

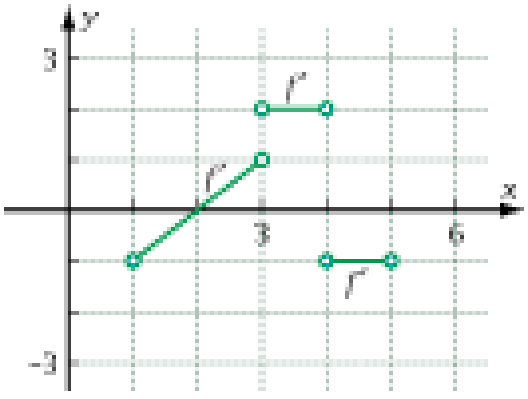
2. The graph of *f* ', the derivative of *f*, is shown in the figure. Which of the following describes all relative extrema of *f* on the open interval (a, b)?



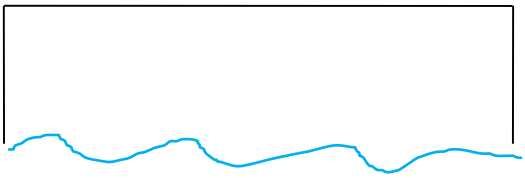
(A.) One relative maximum and two relative minima
(B.) Two relative maxima and one relative minimum
(C.) Three relative maxima and one relative minimum
(D.) One relative maximum and three relative minima.
(E.) Three relative maxima and two relative minima.

3. What conditions would enable you to conclude that the graph of $f(x)$ has a point of inflection at $x = c$?

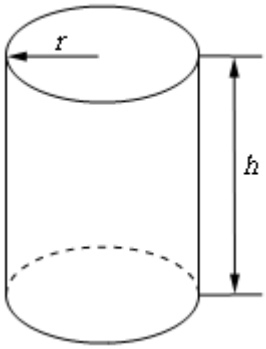
4. The graph of the **derivative** of $f(x)$ is below. Use it along with the fact that $f(2) = -2$ and the domain is $x \in [1,5]$ to sketch the graph of the function. Make number line graphs for $f'(x)$ and $f''(x)$ and use the idea of area to help you.



5. A rectangular plot of farmland will be bounded on one side by a river and on the other three sides by a single strand electric fence. With 800 m of wire at your disposal, what is the largest are you can enclose, and what are its dimensions? Justify using calculus that a maximum was found.



6. A manufacturer needs to make a cylindrical can that will hold 1.5 liters of liquid. Determine the dimensions of the can that will minimize the amount of material used in its construction. Justify with a graph that a minimum was found. [hint: $1l = 1000\,cm^3$}



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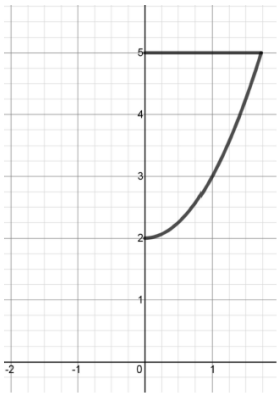
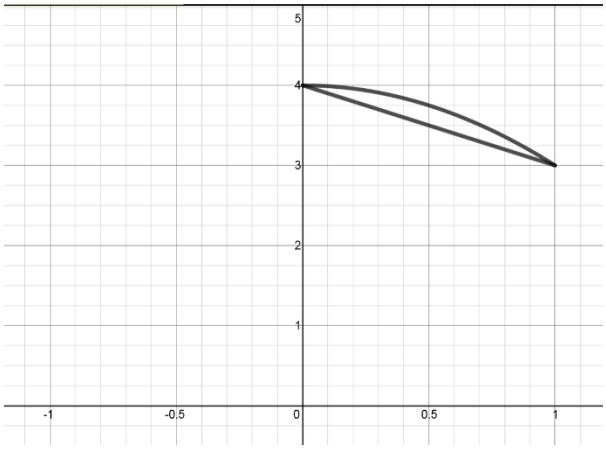
Solids of Revolution: Draw the solids & cut (dy or dx). Set up the correct integral with the correct boundaries to find the volume. Use numerical integration.

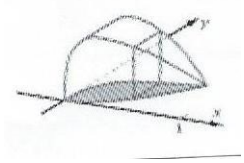
7. Rotate about the $y-axis$: $y=x^2+2$ $y=5$ $y=0$



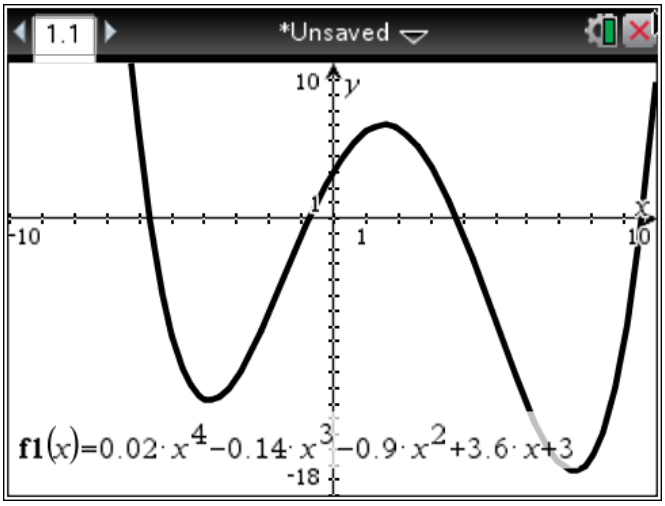
8. Rotate around the $y-axis$: $y=4-x$ $y=4-x^2$



9. Let R be the region in the first quadrant bounded by the graphs $y=x^{\frac{1}{5}}$ and $y=x^2$. Region R is the base of a solid whose cross sections perpendicular to the $x-axis$ are squares, as shown below. Find the volume of the solid.

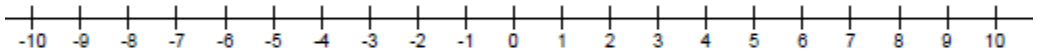


10. Given the function: $f(x) = 0.02x^4 - 0.14x^3 - 0.9x^2 + 3.6x + 3$
There is not room to complete this problem on this sheet.



a) Find the first derivative, the zeros of the first derivative and complete the number line with the SIGN of the value of the first derivative.

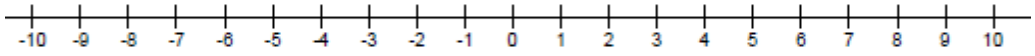
f'(x)
f(x)



b) What do the sign of these values tell you about the behavior of the original function f(x)? In other words, based on the critical points of the first derivative, tell me in words when the function is decreasing and increasing in words and justify. Also tell me in words when the function has an extrema and justify using the first derivative.

c) Find the second derivative, the zeros of the second derivative, and complete the number line with the SIGN of the value of the second derivative

f'(x)
f(x)



d) What do the sign of these values tell you about the shape of the original function f(x)? In other words, based on the critical points of the second derivative, tell me in words about the shape of the original function f(x) and justify. Also, indicate in words where the original function has points of inflection and justify using the second derivative.