

20 October 2015

1. **Warm up:** Consider the following problem:

Find the maximum and minimum values of the function $f(x) = 5x^5 + 4x^4 - 3x^3 + x - 10$.

Do not solve the problem! Instead list the steps you would take to solve the problem.

2. Consider the function

$$f(x) = \frac{x^3 - 4x^2 + 3x}{x^2 + 3x - 10}.$$

- (a) What are the x - and y -intercepts of the function?
- (b) What are the asymptotes of the function?
- (c) What are the maxima and minima of the function?
- (d) Graph the function.

3. Consider the relation $x^2 - y^2 = x^3$.

(a) Is this a function? Why or why not?

(b) What values of x satisfy the relation when $y = 0$? What does this say about the graph of the relation?

(c) Find the derivative of x with respect to y of the relation.

(d) Explain what happens to the derivative you found in part (c) at $x = 0$.

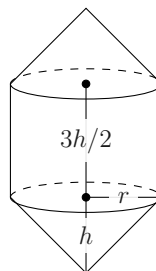
4. Answer the following questions with “True” or “False,” justifying your choice.

(a) If the radius of a circle is increasing, its area is increasing at the same rate.

(b) The rate of change of distance between two moving cars does not depend on where they started out.

(c) If the only term with a y in an equation is $5yx^2$, then the equation is not a function.

5. Two cones are attached to the top and bottom of a cylinder, as in the picture below. The height of the cones is h and the height of the cylinder is $3h/2$, and the radius of the cones and cylinder is r .



The total surface area is a fixed number A . Find the r and h that maximize the total volume of the shape.