GROUP WORK 3, SECTION 4.3

Graphing with the Derivative (Form A)

This exercise is designed to illustrate how numerical information from a function and its derivatives can be used to get a very good sense of how the function looks. While it is a good idea to use your graphing calculator to check your final answers, it would be missing the point to use it earlier.

Consider the function

$$f(x) = \frac{2x}{x^2 - 1}$$

1. Where are the zeros (roots) of this function?

2. On what intervals is this function increasing? On what intervals is it decreasing?

3. Where are the local maxima and minima?

4. It is a fact that $f''(x)$ simplifies to $4x\frac{x^2+3}{(x^2-1)^3}$. Where is f concave up? Where is f concave down?

5. Where are the inflection points?

6. Does this graph have any vertical asymptotes? If so, what are they? If not, why not?

7. What appears to happen to $f(x)$ when x gets very large? What appears to happen when x gets very large and negative?

8. Using this information, sketch a graph of this function on a separate piece of paper.

GROUP WORK 3, SECTION 4.3

Graphing with the Derivative (Form B)

This exercise is designed to illustrate how numerical information from a function and its derivatives can be used to get a very good sense of how the function looks. While it is a good idea to use your graphing calculator to check your final answers, it would be missing the point to use it earlier.

Consider the function

$$f(x) = x^{1/3}(x-4)$$

1. Where are the zeros (roots) of f?

2. Does f' have any points x where $f'(x) = 0$? Where $f'(x)$ is not defined?

3. On what intervals is f increasing? On what intervals is it decreasing?

4. Where are the local maxima and minima of f?

5. Does f'' have any points x where $f''(x) = 0$? Where $f''(x)$ is not defined?

6. Where is f concave up? Where is it concave down?

7. Where are the inflection points of f?

8. Using this information, sketch a graph of $y = f(x)$ on a separate piece of paper.