

**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.