

## SECTION 4.5: DERIVATIVES AND THE SHAPE OF THE GRAPH

1. When  $f$  increases, decreases and its derivative.

2. The First Derivative Test

3. For the function  $f(x) = \frac{2}{3}x^3 + x^2 - 12x + 7$ :

- (a) Determine the intervals where  $f(x)$  is increasing or decreasing.
- (b) Use the First Derivative Test to identify the location of all local extrema.
- (c) Use technology to confirm your work.

4. Identify all local extrema for  $f(x) = x^2e^x$ .

5. Concavity and points of inflection

6. Test for Concavity

7. Determine the intervals for which the function  $f(x) = \frac{2}{3}x^3 + x^2 - 12x + 7$  is concave up and concave down. Identify the  $x$ -coordinate of any inflection points.

8. Do the same for  $f(x) = x^2e^x$ .