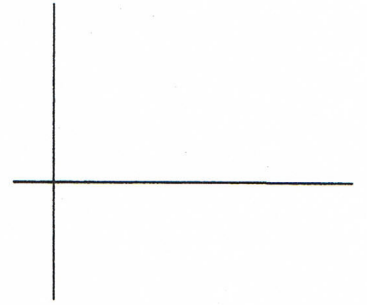


CALCULUS
LAB ON DISCOVERING RELATIONSHIPS

For each of the functions given, you will calculate its first derivative. By observing the graphs of the function and its derivative, you will discover a relationship between the function and its derivative.

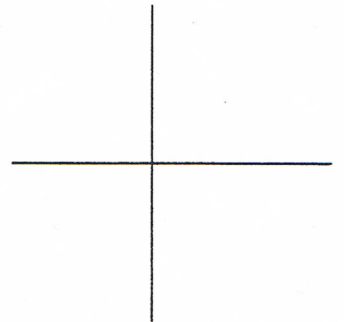
Given $f(x) = x^2 - 6x - 8$. Graph $f(x)$ and $f'(x)$ in a friendly window. Sketch below.

1. Where do the relative maximum and minimum values of $f(x)$ occur? _____
2. For which values of x is $f'(x)$ equal to zero? _____
3. For which values of x is $f(x)$ increasing? _____
4. For what intervals is $f'(x)$ positive? _____
5. For which values of x is $f(x)$ decreasing? _____
6. For what intervals is $f'(x)$ negative? _____



Given $f(x) = \frac{1}{3}x^3 - x^2 - 3x + 2$. Graph $f(x)$ and $f'(x)$ in a friendly window. Sketch below.

7. Where do the relative maximum and minimum values of $f(x)$ occur? _____
8. For which values of x is $f'(x)$ equal to zero? _____
9. For which values of x is $f(x)$ increasing? _____
10. For what intervals $f'(x)$ positive? _____
11. For which values of x is $f(x)$ decreasing? _____
12. For what intervals is $f'(x)$ negative? _____



After you have finished your investigation, complete these statements:

The relative maximum and minimum values of f occurred when _____

The function f is increasing when _____

The function f is decreasing when _____