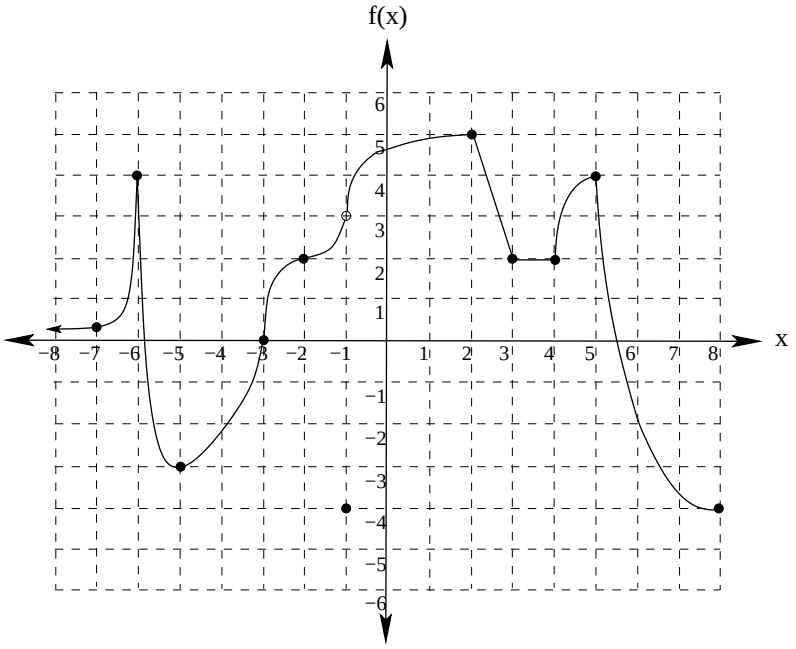
Math 261 - Lab 13 **Extrema of Functions** **Name:** _____

Show all work for credit. Also, give exact answers unless otherwise noted.

1. Answer the following questions based on the graph of $f(x)$ shown below:



   (a) Find the intervals on which f is increasing.

   (b) Find the intervals on which f is decreasing.

   (c) Find the x-values at which a local maximum of f occurs?

   (d) Find the x-values at which a local minimum of f occurs?

   (e) Find the absolute maximum of f, if it exists, along with the x-value(s) where it occurs.

   (f) Find the absolute minimum of f, if it exists, along with the x-value(s) where it occurs.

2. Find the critical numbers for each of the following functions:

(a) $f(x) = x^3 - 2x^2 - 4x + 12$

(b) $f(x) = \dfrac{x^2 - x + 4}{x - 1}$

(c) $f(x) = \sin^2 x - \cos x$

(d) $f(x) = \dfrac{x^2}{x - 2}$

3. Find the absolute extrema of each function on the given interval:

(a) $f(x) = x^3 - 7x^2 - 5x + 10$ on $[-1, 8]$

(b) $f(x) = 3x^4 - 54x^2 - 7$ on $[-5, 4]$

(c) $f(x) = x\sqrt{x+1}$ on $[-1, 2]$

(d) $f(x) = \dfrac{4}{x-3} + 9x + 2$ on $[0, \frac{7}{2}]$