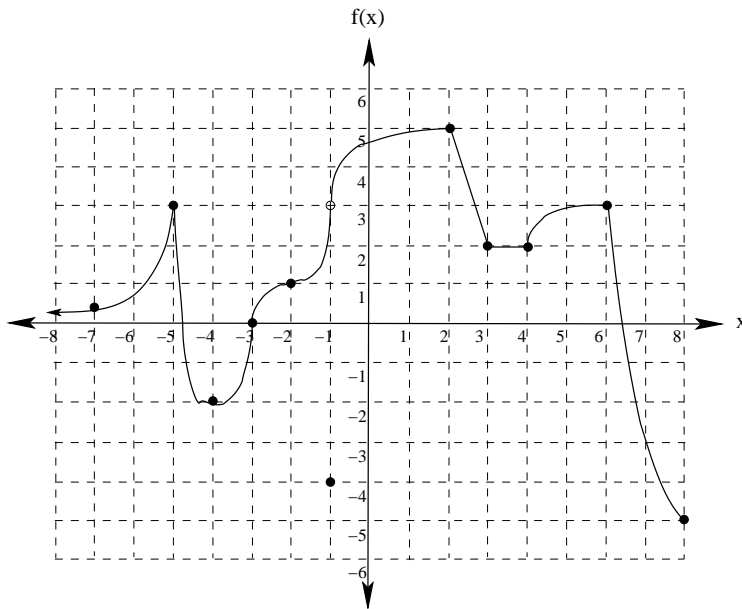1. Answer the following questions based on the graph of $f(x)$ shown below:

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

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

(c) Where are the local maxima of f?

(d) Where are the local minima of f?

(e) Find the absolute maximum of f, if it exists.

(f) Find the absolute minimum of f, if it exists.

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) $f(x) = \sec\left(\dfrac{1}{x}\right)$

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 $[0, \frac{7}{2}]$