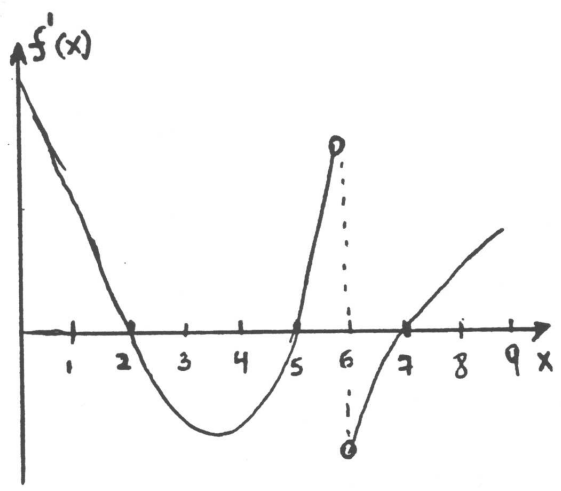
Problem Sheet C

1. Let $f(x) = (x-2)(-x+4)$ and $g(x) = |f(x)|$.
   (a) Graph $f(x)$.
   (b) Find $f'(x)$ and $f''(x)$ and graph them.
   (c) Graph $g(x)$.
   (d) Find $g'(x)$ and $g''(x)$ and graph them.
   (e) For what values of x is $g'(x)$ undefined?
   For what values of x is $g''(x)$ undefined?
   (f) Find $\lim_{x\to 4^+} g'(x)$ and $\lim_{x\to 4^-} g'(x)$
   (g) Find $\lim_{x\to 2^+} g''(x)$ and $\lim_{x\to 2^-} g''(x)$

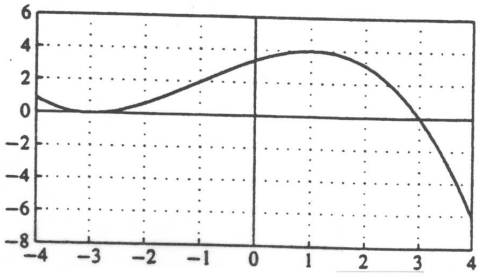
2. The graph of the derivative of a *continuous* function f appears below. (The graph of f is not shown.)



   (a) Where does f have local maxima?
   (b) Where does f have local minima?
   (c) Where does f have points of inflection (points about which the concavity changes)?
   (d) Sketch the graph of a function that could be f. Make your graph go through $(0, 0)$.

3. Is there a continuous function f whose derivative is $f'(x) = |x|$? If so, find this family of functions.

4. Below is a graph of $v(t)$, the velocity of a creature at time t.



   (a) Sketch a graph of $a(t)$, the creature's acceleration.
   (b) Sketch a graph of $s(t)$, the creature's postion, assuming that $s(0) = 1$.