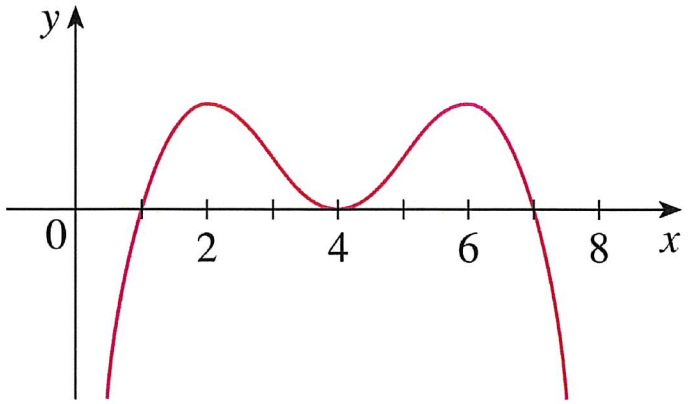
Name:
Sec. 4.3 – Derivatives and shapes of graphs
Math 251



1. In each part state the inflection points of f.

   (a) The curve is the graph of f.

   $x=3 \Rightarrow f$ changes from concave down to up.

   $x=5 \Rightarrow f$ changes from concave up to down.

   (b) The curve is the graph of f'.

   Now we need to find x s.t $f''(x)=0$ & changes sign.
   This happens at $x=2$, $x=4$, $x=6$

   (c) The curve is the graph of f''.

   $x=1$, $x=7$

   Notice that $x=4$ is NOT an inflection point because the sign of $f''(x)$ does not change

2. For $f(x) = x^4 - 2x^2 + 3$ find

   (a) The intervals on which f is increasing or decreasing.

   (b) The local maximum and minimum values of f.

   (c) The intervals of concavity and inflection points.

$f'(x) = 4x^3 - 4x$

$4x(x^2-1) = 4x(x+1)(x-1)$

$f''(x) = 12x^2 - 4$ → repeat as in a to find intervals of concavity

(a)

Interval	$(x+1)$	x	$x-1$	$f'(x)$	f
$x<-1$	−	−	−	−	$f\downarrow$ on $(-\infty,-1)$
$-1<x<0$	+	−	−	+	$f\uparrow$ on $(-1,0)$
$0<x<1$	+	+	−	−	$f\downarrow$ on $(0,1)$
$x>1$	+	+	+	+	$f\uparrow$ on $(1,\infty)$

$f(0) = 3$ is a local max

$f(\pm 1) = 2$ are local min.