

04/02/2011

Quiz 5

Date Math 132 No.

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

- a) Find all critical points of f
- b) Find intervals in which f is increasing or decreasing
- c) Find any relative or absolute extremum of f
- d) Find intervals in which f is concave up or down
- e) Find all inflection points of f
- f) Sketch the graph of f .

Solution

a) $f'(x) = 12x^2 - 12x^3 = 12x^2(1-x)$

So $f'(x) = 0$ iff $x=0$ or $x=1$. Thus $f(x)$ has only two critical points given by $x=0$ and $x=1$.

b)	x	$-\infty$	0	1	$+\infty$	f is increasing on $(-\infty, 1)$	
	$f'(x)$	$+$	ϕ	$+$	ϕ	$-$	f is decreasing on $(1, +\infty)$
	$f(x)$	$-\infty$		1	$-\infty$		

c) 1 is an absolute maximum.

d) $f''(x) = 12[2x(1-x) - x^2] = 12x(2-3x)$

	x	$-\infty$	0	$\frac{2}{3}$	$+\infty$	f is concave down on $(-\infty, 0) \cup (\frac{2}{3}, +\infty)$	
	$f''(x)$	$-$	ϕ	$+$	ϕ	$-$	f is concave up on $(0, \frac{2}{3})$

e) 0 and $\frac{2}{3}$ are inflection points.

f)

