Math 121 S09N02 - Quiz 6 Name: SOLUTIONS
Mar 19 2009 Stu#:

(1) **[7 points]** Determine the critical numbers of $F(x) = x^{4/5}(x-4)^2$.

$$F'(x) = \frac{4}{5}x^{-\frac{1}{5}}(x-4)^2 + x^{\frac{4}{5}} \cdot 2(x-4)$$

$$= \frac{4(x-4)^2}{5x^{\frac{1}{5}}} + \frac{2x^{\frac{4}{5}}(x-4)}{5x^{1/5}} \cdot 5x^{\frac{1}{5}}$$

$$= \frac{4(x-4)^2 + 10x(x-4)}{5x^{\frac{1}{5}}}$$

$$= \frac{(x-4)\left[4(x-4) + 10x\right]}{5x^{1/5}}$$

$$= \frac{(x-4)(14x-16)}{5x^{\frac{1}{5}}}$$

- $\underline{F'(x) = 0}$: $(x-4)(14x-16) = 0$

$$\Rightarrow \quad x-4=0, \quad 14x-16=0$$

$$x=4, \quad x = \frac{16}{14} = \frac{8}{7}$$

- $\underline{F'(x) \text{ does not exist}}$ at $x = 0$

$\therefore$ critical numbers are $x = 0, \frac{8}{7}, 4$

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(2) [**8 points**] Find the absolute maximum and absolute minimum values of

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

on the closed interval $[-2, 3]$.

$$f'(x) = 6x^2 - 6x - 12$$
$$= 6(x^2 - x - 2)$$
$$= 6(x-2)(x+1)$$

$\therefore$ $f'(x) = 0$ at $x = 2$, $x = -1$

($f'(x)$ exists for all real x).

x	$f(x) = 2x^3 - 3x^2 - 12x + 1$
-2	-3
-1	8
2	-19
3	-8

$\therefore$ f has an abs. max. of 8 at $x = -1$,

f has an abs. min. of -19 at $x = 2$.