Name: _____ Math 211 Quiz 7

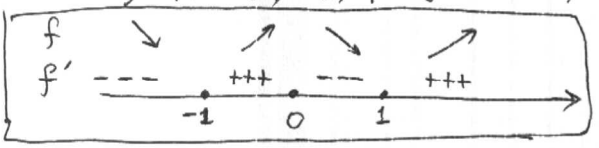
Section: 322 □ 323 □ Nov 1, 2012

1. (a) (5 pts) Find the intervals on which f is increasing or decreasing.
(b) (5 pts) Find the local maximum and minimum values of f.
(c) (5 pts) Find the intervals of concavity and the inflection points.

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

$f'(x) = 4x^3 - 4x = 4x(x^2-1) = 0$

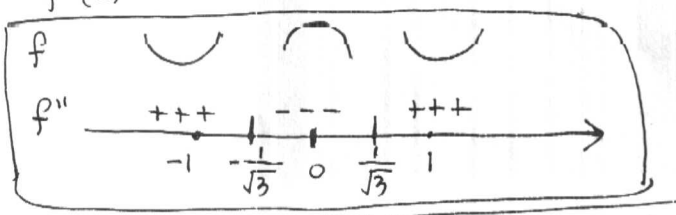
$\Rightarrow x = 0, -1, 1$ (critical points)



local max @ $(0, 2)$
local min @ $(-1, 1)$, $(1, 1)$

$f''(x) = 12x^2 - 4 = 4(3x^2 - 1) = 12\left(x^2 - \frac{1}{3}\right)$

$f''(x) = 0 \Rightarrow x = \pm\sqrt{\frac{1}{3}}$



~~concave up~~ @ $\left(-\frac{1}{\sqrt{3}}, \frac{13}{9}\right)$, $\left(\frac{1}{\sqrt{3}}, \frac{13}{9}\right)$
inflection pts

2. (5 pts) Find the limit. What can you say about the asymptotes of the function?

$$\lim_{x \to -3^+} \frac{x+2}{x+3}$$

$$\lim_{x \to -3^+} \frac{x+2}{x+3} = \frac{-3^+ + 2}{-3^+ + 3} = \frac{-1}{0^+} = -\infty$$

$\Rightarrow$ vertical asymptote: $x = -3$

$$\lim_{x \to \infty} \frac{x+2}{x+3} = \lim_{x \to \infty} \frac{x+2}{x+3} \cdot \frac{\frac{1}{x}}{\frac{1}{x}} = \lim_{x \to \infty} \frac{1 + \frac{2}{x}}{1 + \frac{3}{x}}$$

$$= \frac{1+0}{1+0} = 1 \quad \left(\text{same limit for } \lim_{x \to -\infty}\right)$$

$\Rightarrow$ horizontal asymptote: $y = 1$