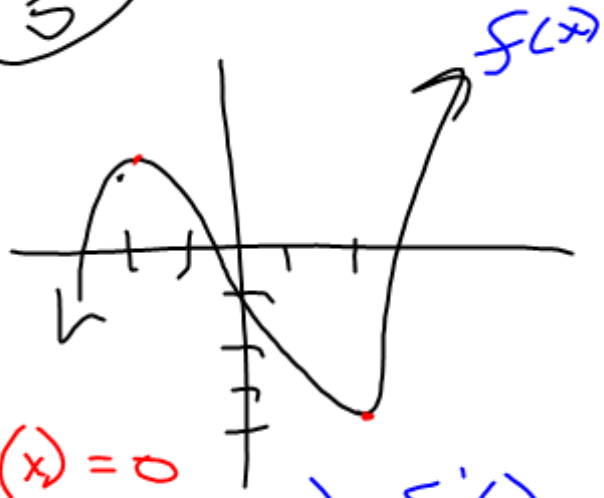
5



b) $f''(x) = 0$ when $x = 0$

Pos: $(0, \infty)$

neg: $(-\infty, 0)$

a) $f'(x) =$ zero (max/min)

$x = 2, -2$

Pos: $(-\infty, -2)$ $(2, \infty)$

Dec: $(-2, 2)$

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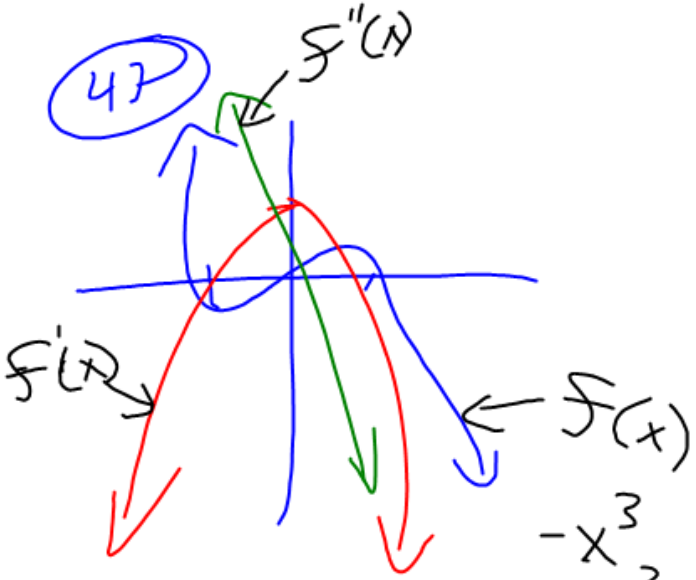
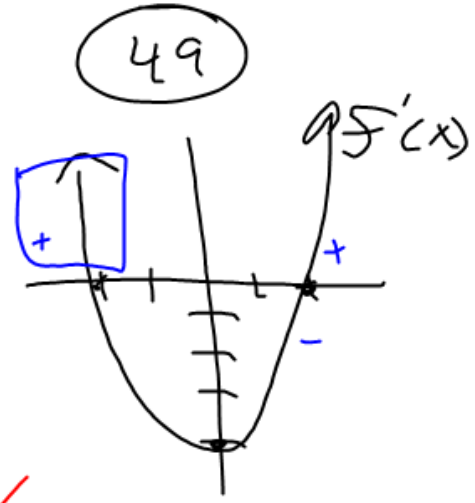
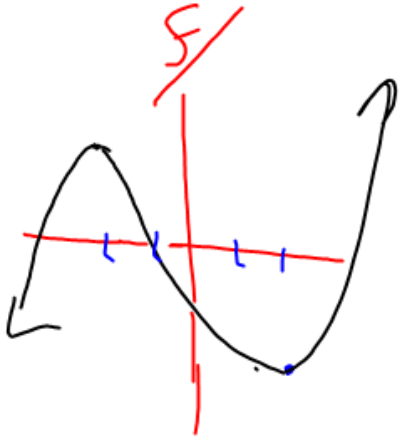


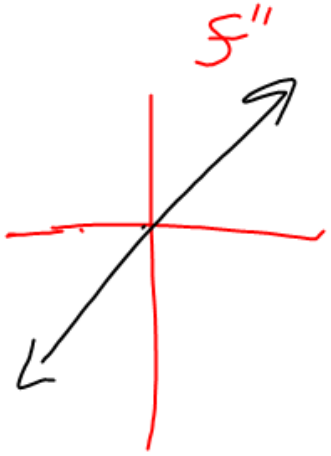
$-x^3$

$-3x^2$

49







3.5 Limits at Infinity

$\lim_{x\to\infty} \frac{1}{x} = \frac{1}{\infty} = 0$

$\lim_{x\to\infty} \frac{2x^2+200x+100}{x^2+1} = 2$ (take Coeff.)

$\lim_{x\to\infty} \frac{x^2}{x} = \lim_{x\to\infty} x = \infty$

* Some books say that $\lim_{x\to\infty} x =$ DNE
  other say $\lim_{x\to\infty} x = \infty$
* there is NO horizontal asymptote for this problem

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

* Can't just simplify!
  Must use long Division.

$$x+3 \overline{)\, 3x^2+2x-1}$$

$3x-7$

$-3x^2+9x$

$-7x-1$

$+7x+21$

20

gives us a slant asymptote (oblique)

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

But your slant asymptote is $y=3x-7$

$$\lim_{x \to \infty} \frac{x-2}{2x-5} = \frac{1}{2}$$

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

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

$$\frac{3x}{|x|}$$

$$\lim_{x \to \infty} \quad 4 + \frac{3}{x} = 4 + \frac{3}{\infty}$$

$$= 4 + 0$$

$$= 4$$

(1) Same Degree: take Coeff.

ex: $\frac{2x}{3x}$ HA: $y = \frac{2}{3}$

(2) Top Bigger: ∞/∞ or DNE

ex. $\frac{3x^3}{x^2}$ HA: use long Division for slant

(3) Bottom Bigger: zero

ex. $\frac{3x}{4x^2} = \frac{3}{4x}$ HA: $y = 0$

$= 0$

$\lim_{x \to \infty} \cos x = DNE$

Pg 205

15, 19 - 33 odd

41, 61