$$y = 4x^3(-x^2 + 1)$$

$y' = 12x^2(-x^2+1) + 4x^3(-2x)$

$-12x^4 + 12x^2 - 8x^4$

$-20x^4 + 12x^2$

$$f(x) = (5x^5 + 1)(3x^3 + 3)$$

$f'(x) = 25x^4(3x^3+3) + (5x^5+1)(9x^2)$

$75x^7 + 75x^4 + 45x^7 + 9x^2$

$120x^7 + 75x^4 + 9x^2$

Curve Sketching

2/14

$$f(x)=\frac{2(x^2-9)}{x^2-4}$$

x-intercepts ± 3

y-int $\frac{9}{2}$

VA $x=2, x=-2$

HA $y=2$

CN 0

Poss pt of inflection $\nexists$

x-int

$0=2(x^2-9)$

$9=x^2$

$\pm 3=x$

y-int

$y=\frac{2(0-9)}{0-4}$

$y=9/2$

VA

$x^2-4=0$

$x=\pm 2$

$\frac{2x^2-18}{x^2-4}$

CN

$f'(x)=\frac{20x}{(x^2-4)^2}$

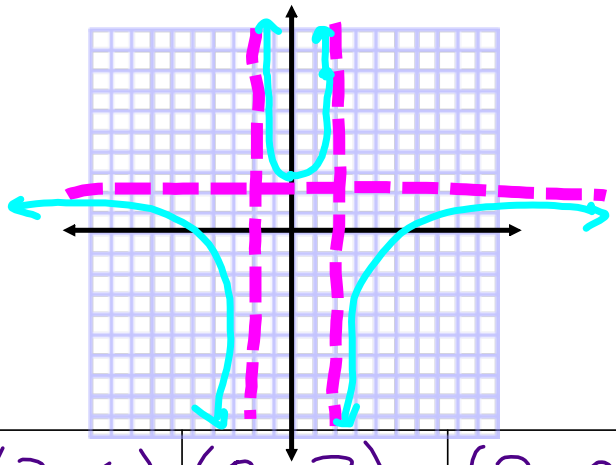
$x=0$

POI

$f''(x)=\frac{-20(3x^2+4)}{(x^2-4)^3}$

$3x^2+4=0$

$3x^2=-4$



	$(-\infty,-2)$	$(-2,0)$	$(0,2)$	$(2,\infty)$
$f'(x)$	−	−	+	+
Inc/dec	dec	dec	inc	Inc
$f''(x)$	−	+	+	−
concavity	down	up	up	down

$$f(x) = x^4 - 12x^3 + 48x^2 - 64x$$

x-int $0 = x(x^3 - 12x^2 + 48x - 64)$

$x = 0$

synth div

4 | 1 -12 48 -64

x-intercepts 0, 4

y-int 0

VA none

HA none

CN 1, 4

Poss pt of inflection 2, 4

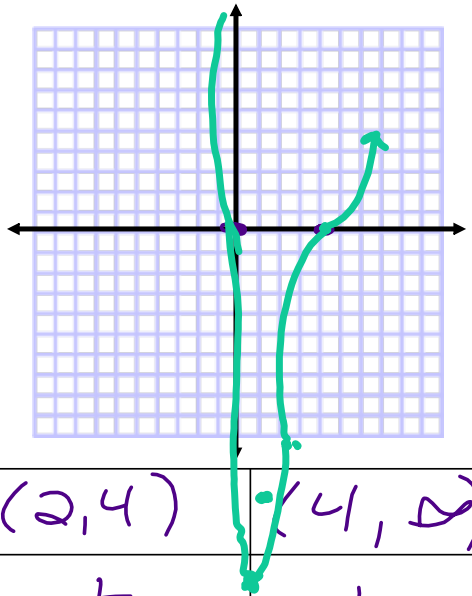
$f'(x) = 4x^3 - 36x^2 + 96x - 64$

1

$f''(x) = 12x^2 - 72x + 96$

$12(x^2 - 6x + 8)$

$(x-2)(x-4)$



	$(-\infty, 1)$	$(1,2)$	$(2,4)$	$(4, \infty)$
$f'(x)$	−	+	+	+
	dec	inc	inc	inc
$f''(x)$	+	+	−	+
	up	up	down	up

min (1, -27)

POI (2, -16) (4, 0)