

§4.4 - Graphing Functions (Part I)Graphing Functions "Guidelines"

- 1 Determine domain/interval of interest
- 2 Use symmetry (if available)
- 3 Find intervals where  $f \nearrow, \searrow$ ; local extrema
- 4 Find intervals where  $f \curvearrowright, \curvearrowleft$ ; inflection pts
- 5 Locate asymptotes (vertical/horizontal/slant)
- 6 Look for  $x, y$  intercepts

# Ex 1 Sketch graph

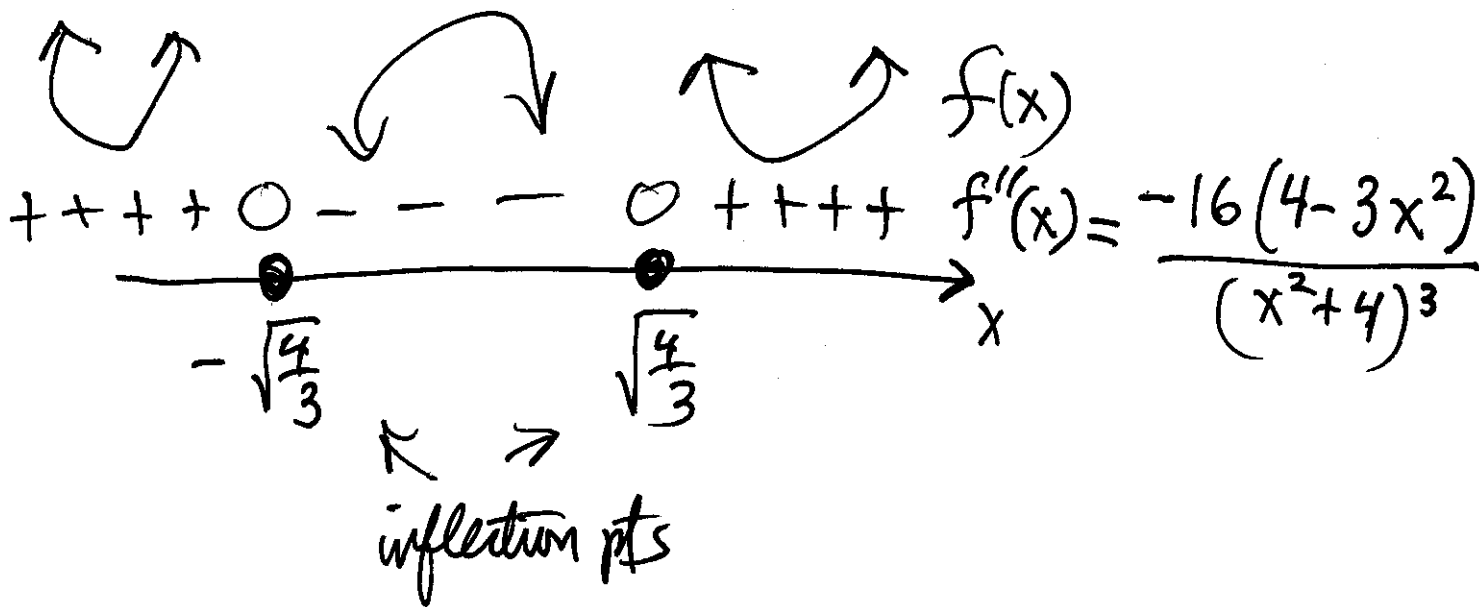
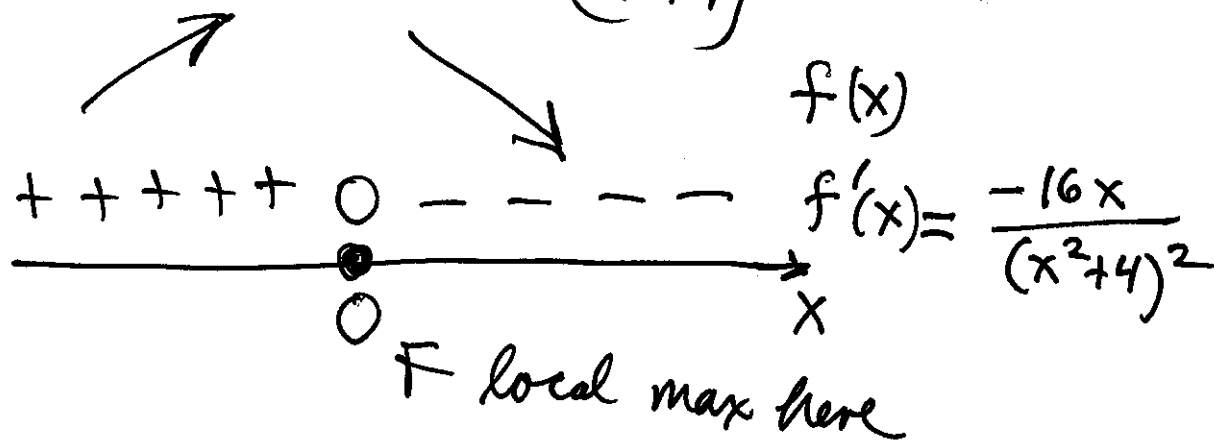
2

(a)  $y = f(x) = \frac{8}{x^2 + 4}$

Domain is all  $x$

$\Rightarrow f'(x) = \frac{-16x}{(x^2 + 4)^2}$  ✓

$\Rightarrow f''(x) = \frac{-16(4 - 3x^2)}{(x^2 + 4)^3}$  ✓✓



x-intercept :  $y = \frac{8}{x^2+4} \Rightarrow \text{no soln.} \quad \boxed{3}$   
(set  $y=0$ )

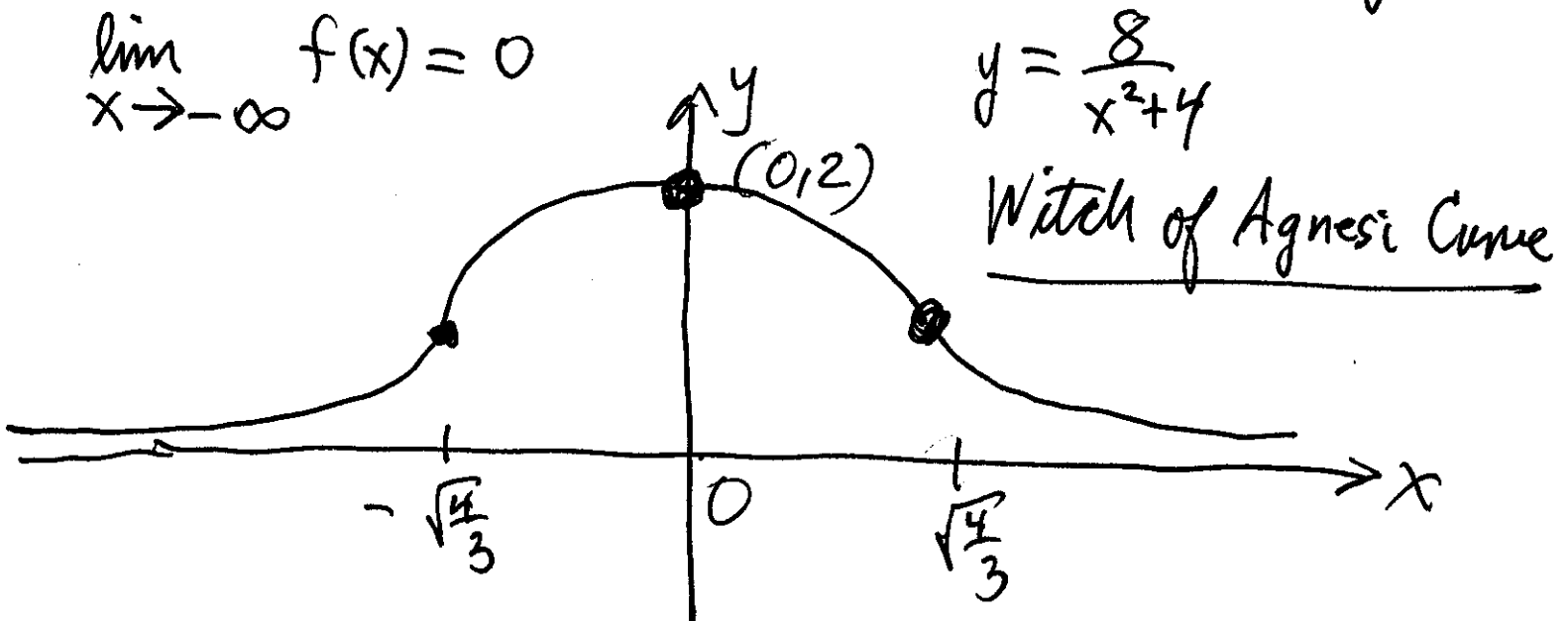
No x-intercept!

y-intercept :  $y = \frac{8}{0^2+4} = 2 \quad \therefore (0, 2)$   
(set  $x=0$ )

$y = f(x) = \frac{8}{x^2+4}$  No vertical asymptotes!

$\lim_{x \rightarrow \infty} f(x) = 0 \Rightarrow y=0$  horizontal asymp.

$\lim_{x \rightarrow -\infty} f(x) = 0$

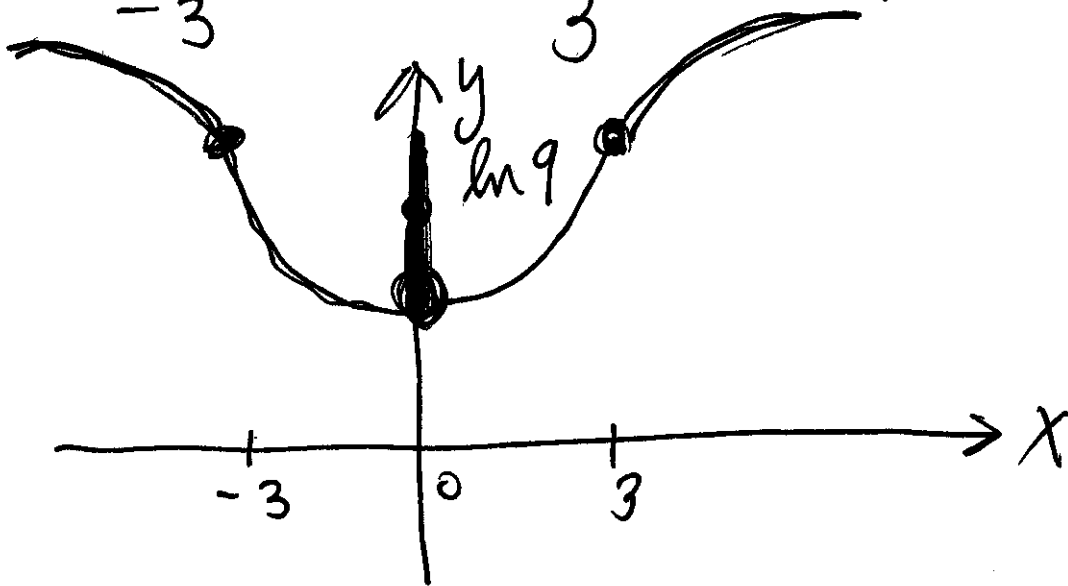
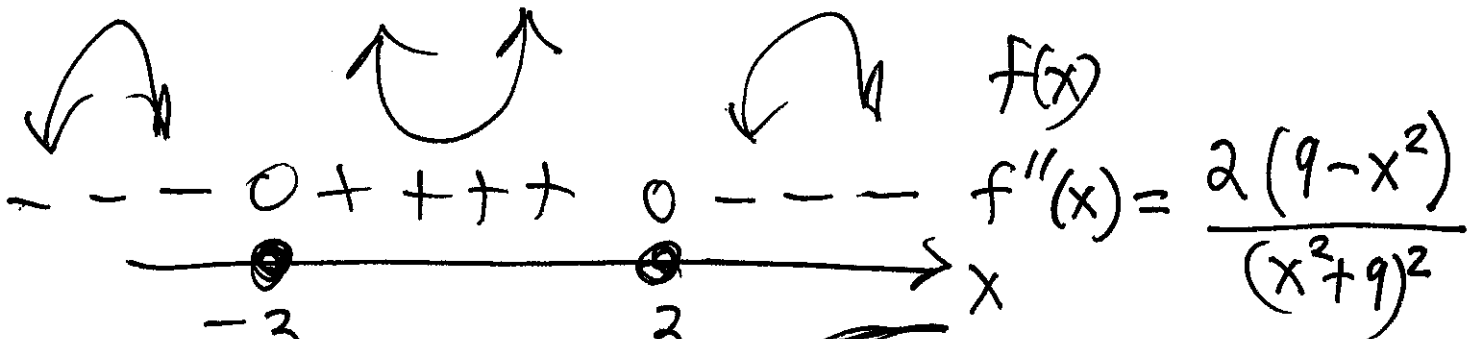
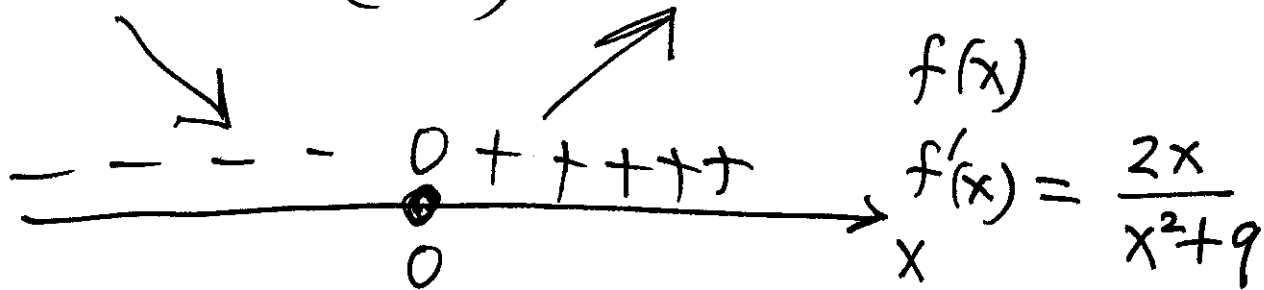


Note:  $y = f(x) = \frac{8}{x^2+4} \Rightarrow f(-x) = f(x)$   
 $\Rightarrow$  curve symm. w.r.t. y-axis

⑥  $y = f(x) = \ln(x^2 + 9)$  Domain all  $x$  4

$\Rightarrow f'(x) = \frac{2x}{x^2 + 9}$  ✓

$\Rightarrow f''(x) = \frac{2(9 - x^2)}{(x^2 + 9)^2}$  ✓✓



$$\textcircled{c} \quad \underline{y = f(x) = 3\sqrt{x} - x\sqrt{x}}$$

domain  $x \geq 0$  3