Recall the guidelines:

A. domain
B. intercepts
C. symmetry
D. asymptotes
E. increase/decrease (and critical numbers)
F. local maxima/minima
G. concavity (and inflection points)
H. sketch the graph

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1. Sketch the graph by applying the guidelines:

$$y = \frac{1}{x^2 - 4}$$

A. $x \neq \pm 2$ or $(-\infty,-2) \cup (-2,2) \cup (2,\infty)$

B. y-intercept: $y = -\frac{1}{4}$, x-intercepts: none

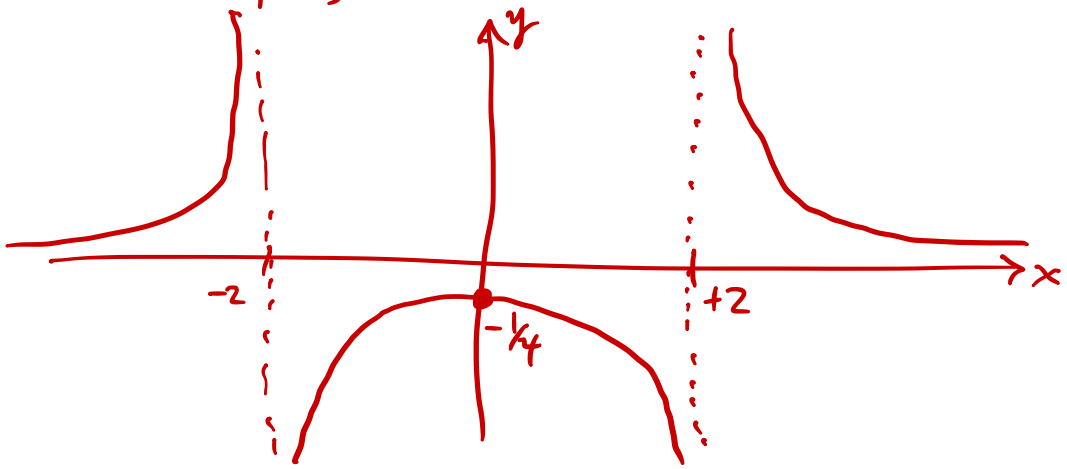
C. even

D. $x=-2$ and $x=+2$ are vertical [e.g. $\lim_{x\to 2^+} \frac{1}{x^2-4} = +\infty$]
$y=0$ is horizontal [$\lim_{x\to\pm\infty} \frac{1}{x^2-4} = 0$]

E. $y' = -(x^2-4)^{-2}(2x) = \frac{-2x}{(x^2-4)^2}$ $\therefore$ $x=0$ is crit. #
increasing $(-\infty,-2) \cup (-2,0)$
decreasing $(0,2) \cup (2,\infty)$

G. $y'' = \frac{-2(x^2-4)^2 - (-2x)2(x^2-4)(2x)}{(x^2-4)^4} = \frac{2(3x^2+4)}{(x^2-4)^3}$

$\therefore$ no infl. pts., concave up: $(-\infty,-2) \cup (2,\infty)$, concave down: $(-2,2)$



2. Sketch the graph by applying the guidelines:

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

A. $(-\infty, \infty)$

B. $y=0$, $x=0$ & $x=4$

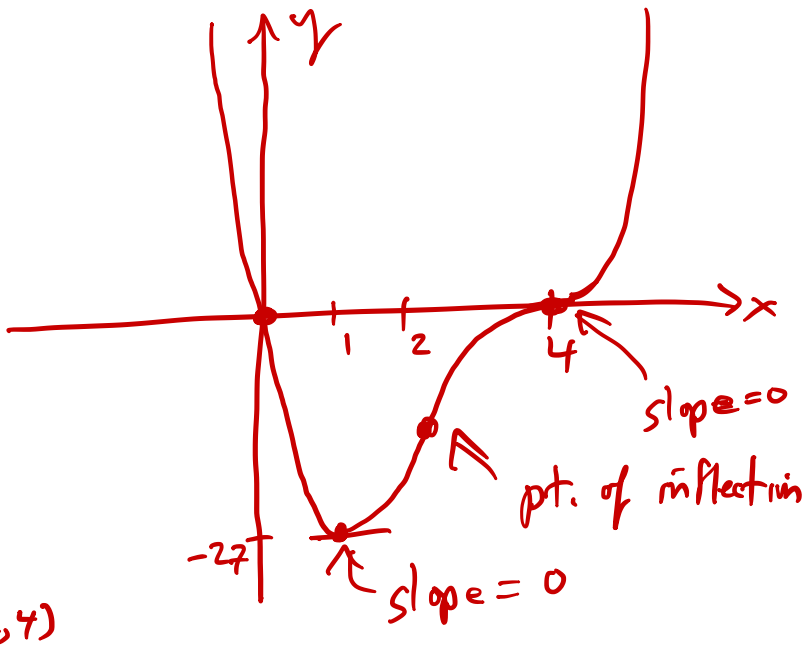
C. none

D. none

E. increasing on $[1,\infty)$
decreasing on $(-\infty, 1]$
crit. #s: $x=1, 4$

F. $x=1$ is loc. min. ($y=-27$)
no loc max

G. $x=2, 4$ inflection points
concave up: $(-\infty,2)\cup(4,\infty)$, down: $(2,4)$



3. Sketch the graph by applying the guidelines:

$y = \dfrac{x}{\sqrt{x^2+1}}$, $y' = \dfrac{1}{(x^2+1)^{3/2}}$, $y'' = \dfrac{-3x}{(x^2+1)^{5/2}}$

A. $(-\infty, \infty)$

B. $(0,0)$ is both

C. odd

D. $y=-1, y=+1$ are hor. asympts.
[e.g. $\lim_{x\to\infty} \frac{x}{\sqrt{x^2+1}} = 1$]

E. no crit. #s
increasing on $(-\infty, \infty)$

F. $x=0$ is infl. pt.
concave up $(-\infty, 0)$
concave down $(0, \infty)$