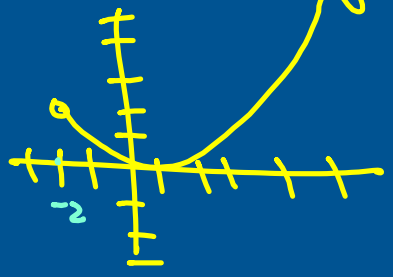
Semester Review

Domain/Range

Graph: Domain: x's L to R
Range: y's Low to High



D: $(-2, \infty)$
R: $[0, \infty)$

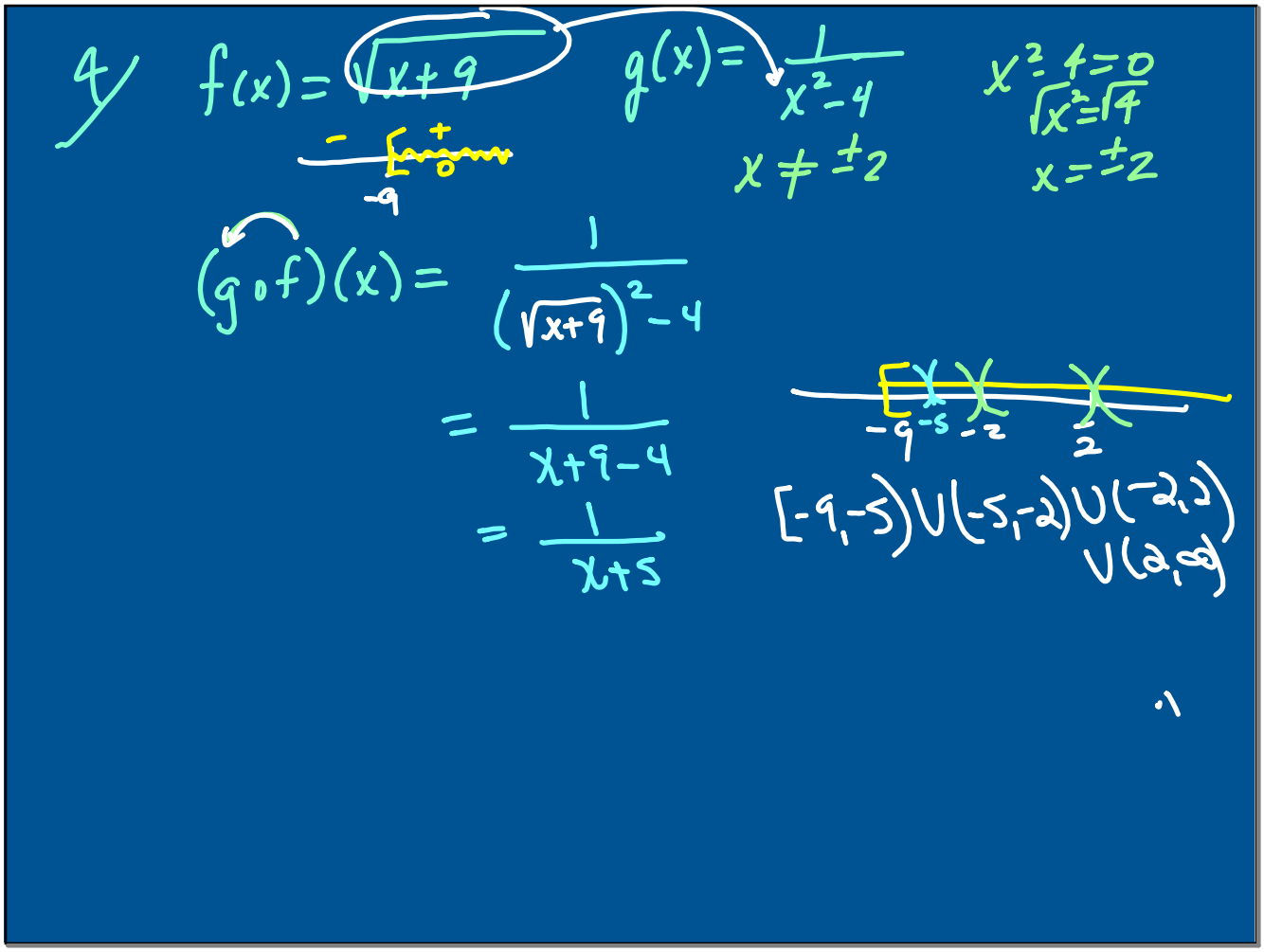
	Domain
Polynomial x^3+2x^2+2x	$\mathbb{R}$ or $(-\infty, \infty)$
Rational $\frac{x+3}{x-3}$	Denom $\neq 0$ $x \neq 3$
Odd Root $\sqrt[3]{x-7}$	$\mathbb{R}$
Even Root $\sqrt{x-4}$	Must contain + values Test Points!

Like 3

$$f(x) = \frac{\sqrt{4-x}}{x+2}$$

Find domain

$(-\infty, -2) \cup (-2, 4]$


4)
f(x) = √(x+9)
g(x) = 1/(x²−4)
x²−4=0
√x² = √4
x = ±2
x ≠ ±2
− + +
−9
(g∘f)(x) = 1/((√(x+9))²−4)
= 1/(x+9−4)
= 1/(x+5)
−9 −5 −2 2
[−9,−5) ∪ (−5,−2) ∪ (−2,2) ∪ (2,∞)

Find $f^{-1}(x)$.

$\cancel{f(x)} \overset{y}{=} \sqrt[3]{3x^2+1}$

$(x)^3 = \left(\sqrt[3]{3y^2+1}\right)^3$

$x^3 = 3y^2 + 1$

$\frac{x^3-1}{3} = \frac{3y^2}{3}$

$\sqrt{\frac{x^3-1}{3}} = \sqrt{y^2}$

$\pm\sqrt{\frac{x^3-1}{3}} = y$

1) Switch x & y
2) Solve for y.

Lines

$y = mx + b$

point-slope

$y - y_1 = m(x - x_1)$

$Ax + By = C$

$m = -\frac{A}{B}$

EVEN/ODD

EVEN $f(-x) = f(x)$

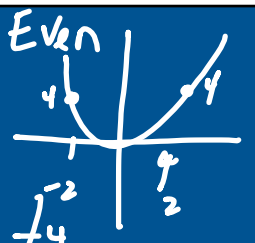
ODD $f(-x) = -f(x)$

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

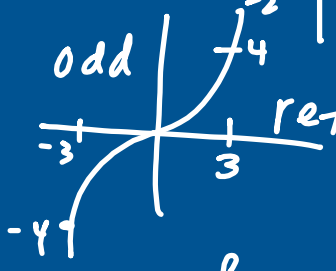
$$f(-x) = \frac{(-x)^2+4}{-x} = \frac{x^2+4}{-x}$$

$$= -\frac{x^2+4}{x}$$

odd



Reflect y-axis



reflect across origin

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

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

$$= -x^3 + 1$$

$$= -(x^3 - 1)$$

Neither

Asymptotes

$$y = \frac{x^2 - 9}{x^2 + 4x + 3}$$

Vertical = where denom = 0

Holes → When terms cancel

Vertical

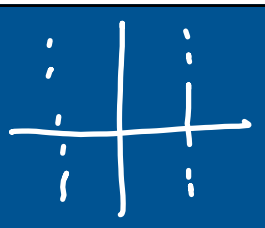
$$\frac{(x+3)(x-3)}{(x+3)(x-1)}$$

Hole at $x = 3$

Vertical: $x = 1$

Vertical

Denom = 0



Horizontal

1) Determine highest power
2) Take that term from num. & denom.

$$\frac{x^2}{x^2} = 1 \qquad \boxed{y = 1}$$

$$f(x) = \frac{x + 4}{x^2 - 7}$$

$$\frac{0x^2}{x^2} \qquad \boxed{y = 0}$$

Slant – when numerator is one power higher

– Find using long division

$$f(x) = \frac{4x^2 + 6x + 1}{2x - 1}$$

Vertical

$$\boxed{x = \frac{1}{2}}$$

$$2x - 1 \;\overline{)\; 4x^2 + 6x + 1}$$

$$2x + 4$$

$$-4x^2 + 2x$$

$$8x + 1$$

$$\boxed{y = 2x + 4}$$

December 3, 2025