December 4, 2024

Semester Review

Domain/Range

Graph: Domain: x's L to R

Range: y's Low to High

	Domain
Polynomial x^3+2x^2+2x	$\mathbb{R}$
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 Testing Pts.

Like 3

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

Even Root
Rational

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

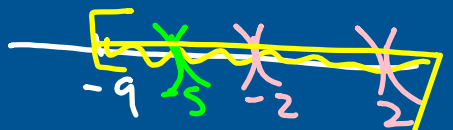
4) $f(x)=\sqrt{x+9}$ $\quad g(x)=\dfrac{1}{x^2-4}$

$x \neq \pm 2$

$$(g\circ f)(x)=\frac{1}{\left(\sqrt{x+9}\right)^2-4}=\frac{1}{x+9-4}=\frac{1}{x+5}$$

$x \neq -5$

Domain:



$$[-9,-5)\cup(-5,-2)\cup(-2,2)\cup(2,\infty)$$

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

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

y

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

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

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

$\pm\sqrt{\frac{x^3-1}{3}} = f^{-1}(x)$

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

Lines

$y = mx + b$

* Point-slope

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

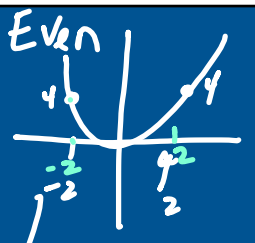
$Ax + By = C$

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

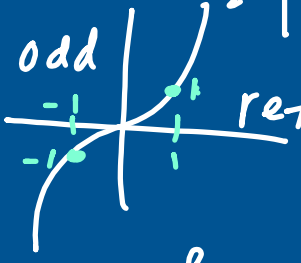
EVEN/ODD

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

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



Reflect y-axis



reflect across origin

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

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

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

odd

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

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

$$= -x^3 + 1$$

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

different

Neither

Asymptotes

$$y = \frac{x^2-9}{x^2-4x+3} = \frac{(x-3)(x+3)}{(x-1)(x-3)}$$

$x \neq 1$

Vertical

$x = 1$

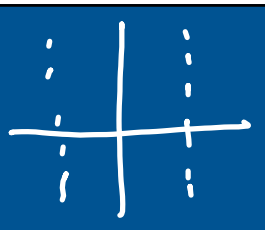
Holes

Hole at $x = 3$

When terms cancel

Vertical

Denom $= 0$



Horizontal

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

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

$y = 1$

Slant – when numerator is one power higher

– Find using long division

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

Vertical $2x-1=0$

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

$$\begin{array}{r} 2x+4 \\ 2x-1 \overline{)\,4x^2+6x+1} \\ \text{Change signs} \rightarrow \underline{-4x^2+2x} \\ 8x+1 \end{array}$$

Slant: $y = 2x+4$

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