SEMESTER REVIEW

3 (a) Domain: x L to R
Range: y Low to High

Domain		Domain
Polynomial	$x^4+x^3+2x-5x+7$	$\mathbb{R}$ or $(-\infty,\infty)$
Rational	$\frac{2x+3}{x^2-4x-12}$ $(x-6)(x+2)$	Denom $\neq 0$ $x \neq 6, -2$
Odd Root	$\sqrt[3]{x-4}$	$\mathbb{R}$
Even Root	$\sqrt{x^2-9}$ $(x+3)(x-3)$	Must contain positive values Test Points!

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−3 0 3

$(-\infty,-3] \cup [3,\infty)$

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

$x \neq 7$

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−4 0 7

$[-4,7) \cup (7,\infty)$

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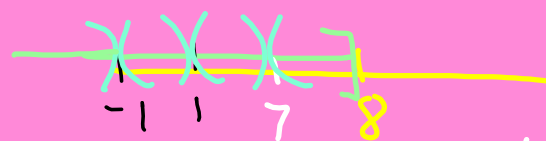
$f(x) = \dfrac{x^2+2}{x^2-1} \qquad g(x) = \sqrt{8-x}$

$f: \ x \neq 1, -1$

$g:$

Find $f \circ g$. $= \dfrac{\left(\sqrt{8-x}\right)^2+2}{\left(\sqrt{8-x}\right)^2-1} = \dfrac{8-x+2}{8-x-1} = \dfrac{10-x}{7-x} \quad x \neq 7$



$(-\infty,-1) \cup (-1,1) \cup (1,7) \cup (7,8]$

5(a) $\cancel{f(x)}\, y = \dfrac{5x+1}{2x-9}$ Find $f^{-1}(x)$.

1) Switch x & y
2) Solve for y

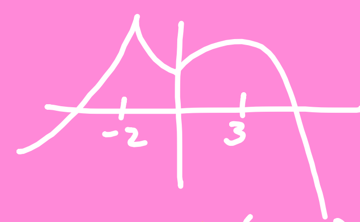
$$(2y-9)x = \frac{5y+1}{\cancel{2y-9}}\,\cancel{(2y-9)}$$

$$2xy - 9x = 5y + 1$$

$$2xy - 5y = 9x + 1$$

$$y(2x-5) = 9x + 1$$

$$y = \frac{9x+1}{2x-5}$$



Inc $(-\infty, -2)$ $(0, 3)$
Dec $(-2, 0)$ $(3, \infty)$
Rel max $(-2, \_)$ $(3, \_)$
Rel min $(0, \_)$
Abs max $(-2, \_)$
Abs min none

Omit 8

Even (y-axis symm) $f(-x) = f(x)$

Odd (origin symm) $f(-x) = -f(x)$

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

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

Odd

10) Determine vertical, horiz, or slant asymp.

Vertical

Denom = 0

$\boxed{x = 2,\ x = -2}$

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

$(x+2)(x-2)$

$x = -2 \quad x = 2$

Horiz

Use highest power term from top + bottom

$$\frac{4\cancel{x^2}}{\cancel{x^2}}$$

$\boxed{y = 4}$

Slant

Numerator is one power higher than denom.

* Use long division

$$y = \frac{6x^2 - 2x + 1}{2x - 1}$$

$$\begin{array}{r|l} & 3x + 1/2 \\ 2x - 1 & 6x^2 - 2x + 1 \\ & -(6x^2 - 3x) \\ & \quad x + 1 \end{array}$$

Change signs

$\boxed{y = 3x + 1/2}$

10(a) $y = \dfrac{x + 5}{x^2 - 2x - 3}$

Horiz $\dfrac{0\cancel{x^2}}{\cancel{x^2}}$

$y = 0$

Up $f(x)+c$

Down $f(x)-c$

Right $f(x-c)$ $y=\sqrt{x-2}$

Left $f(x+c)$ $y=\sqrt{x+2}$

Wide/Narrow $af(x)$

$y=4x^2$

0	0
1	$\cancel{1}$ 4
2	$\cancel{4}$ 16
3	$\cancel{9}$ 36

$-f(x)$

$f(-x)$

$y=-\sqrt{x}$ over x-axis

0	0
1	-1
4	-2
9	-3

$y=\sqrt{-x}$ over y-axis

0	0
-1	1
-4	2
-9	3

13(b)

$$\sqrt{x+3}-\sqrt{2x+5}=7$$

$$\left(\sqrt{x+3}\right)^2=\left(\sqrt{2x+5}+7\right)^2$$

FOIL