Unit 1: Non-Trig Functions PSHS Precalculus 2017-2018

Parent Functions, Transformations & Piecewise Functions

Subject to change

Monday	Tuesday	Wednesday	Thursday	Friday
September 18	19	20	21	22
			Graphs and Attributes of $y = x, x^2, x^3, \sqrt{x}, \lvert x\rvert$ **HW 16**	Graphs and Attributes of $y=b^x, \log_b x, \frac{1}{x}, \frac{1}{x^2}, [[x]]$ **HW 17**
25	26	27	28	29
End Behavior in Limit Notation **HW 18**	Even/Odd Symmetry **HW 19**	Card Sort **HW 20**	Generic Transformations **HW 21**	Discretionary Day
October 2	3	4	5	6 pep rally
Shift, Stretch, Flip both Horiz. and Vert. Transformations of $y = x, x^2, x^3, \sqrt{x}, \lvert x\rvert$ **HW 22**	Shift, Stretch, Flip both Horiz. and Vert. Transformations of $y=b^x, \log_b x, \frac{1}{x}, \frac{1}{x^2}, [[x]]$ **HW 23**	Absolute Value as a Transformation **HW 24**	Writing Equations **HW 25**	Piecewise Functions Evaluate, Graph and Write **HW 26**
9	10	11	12	13
Student Teacher Holiday	Parent/Teacher Conference Day	PSAT	Absolute Value as a Piecewise Function **HW 27**	Discretionary Day (ALEKS)
16	17	18	19	20 end of grade period
Discretionary Day **HW: Review Packet**	Review	**PARENT FUNCTIONS & TRANSFORMATIONS TEST**		

HW 16: Study the Parent Functions completed in class today then complete lines 1-5 on your Parent Functions Attribute Chart (exclude end behavior/limit and odd/even columns). Additionally, you may wish to make flashcards for each function.

HW 17: Study the Parent Functions completed in class today then complete lines 6-10 on your Parent Functions Attribute Chart (exclude end behavior/limit and odd/even columns). Additionally, you may wish to make flashcards for each function.

HW 18: Complete the End Behavior/Limit column on your Parent Functions Attribute Chart and text p.52: # 1, 2, 3, 6 (write end behavior in limit notation for each graph)

HW 19: Complete the Even/Odd column on your Parent Functions Attribute Chart
And algebraically determine whether each function below has even, odd or neither type of symmetry.

1) $f(x) = 4x + 5$

2) $f(x) = x^2 - 6$

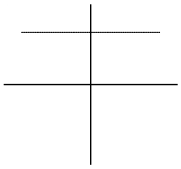
3) $f(x) = x^3 - x - 2$

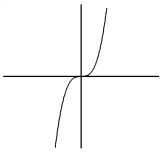
4) $f(x) = \dfrac{x^4 - x}{x^5 - x}$

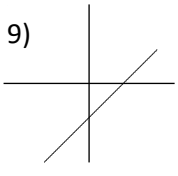
5) $f(x) = \dfrac{x^3 - x}{x^5}$

6) $f(x) = (x-4)^2$

State the symmetry seen in each graph:

7) 

8) 

9) 

HW 20: Complete Parent Functions Checklist below and make flash cards (if you haven't already) by transferring each of the functions to a notecard or piece of construction paper. The graph should be sketched on the front and the equation, type, domain, range, end behavior, zeros, symmetry and asymptotes should be written on the back.

Check all that apply.

	$f(x) = x$	$f(x) = x^2$	$f(x) = x^3$	$f(x) = \|x\|$	$f(x) = \sqrt{x}$	$f(x) = b^x$ $b > 1$	$f(x) = log_b x$ $b > 1$	$f(x) = \frac{1}{x}$	$f(x) = \frac{1}{x^2}$	$f(x) = [[x]]$
Domain: $(-\infty, \infty)$										
Range: $(-\infty, \infty)$										
Range: $[0, \infty)$										
Even function										
Odd function										
No symmetry										
Zero at $x = 1$										
y-intercept: $(0, 1)$										
$\lim_{x \to -\infty} f(x) = -\infty$										
$\lim_{x \to \infty} f(x) = \infty$										
No asymptotes										
Horiz. asymptote at $y = 0$										

HW 21: Graph.

1) $-f(4x)$

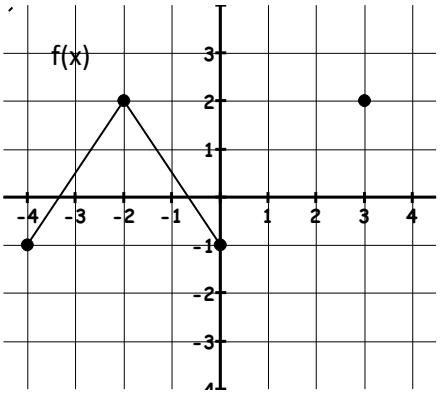
2) $3f\left(-\frac{1}{2}x\right)$

3) $f(2(x+3))$

4) $f(x-4)-2$

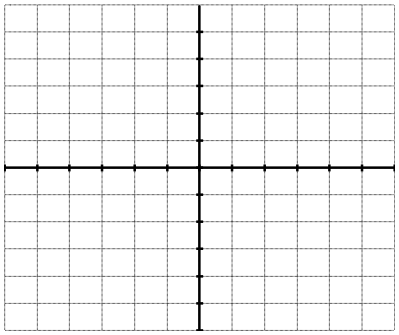
5) $\frac{1}{2}f(-x)+3$

6) $2f(x-3)+1$



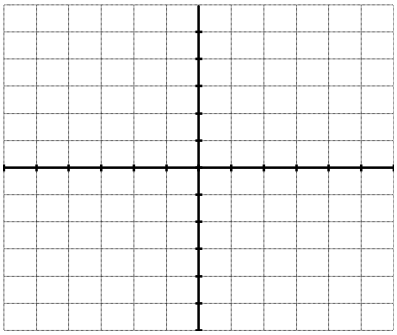
HW 22: State the parent function, describe the transformations in a correct order, show the table of values, graph the transformed function and state the domain and range.

1) $y=\sqrt{\frac{1}{2}(x-1)}$ PF: _____ Trans:



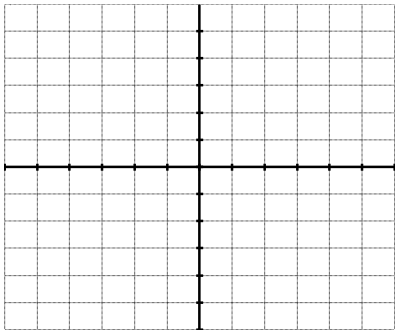
D: R:

2) $y=|3x|+2$ PF: _____ Trans:



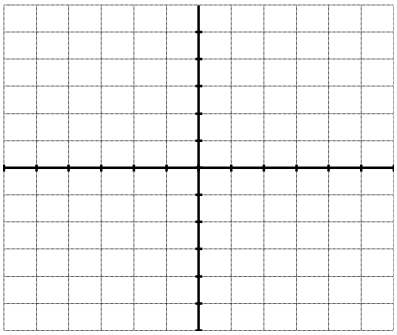
D: R:

3) $y=(-2x)^2+1$ PF: _____ Trans:



D: R:

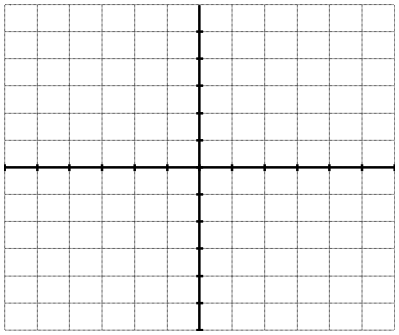
4) $y=\left(-\frac{1}{2}x\right)^3-3$ PF: _____ Trans:



D: R:

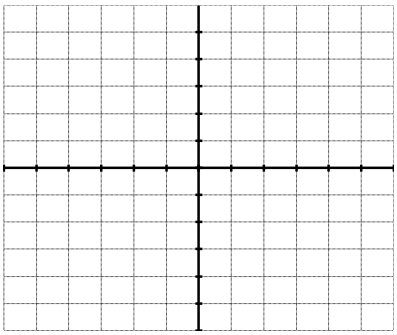
HW 23: State the parent function, describe the transformations in a correct order, show the table of values, graph the transformed function and state the domain and range.

1) $y=-2[[-x]]+1$ PF: _____ Trans:



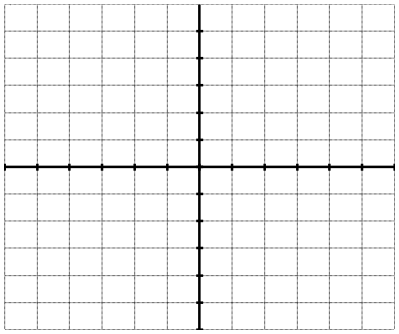
D: R:

2) $y=-\frac{1}{(x-2)^2}$ PF: _____ Trans:



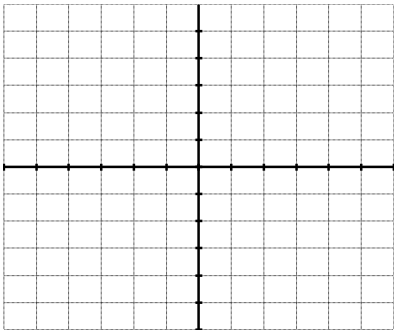
D: R:

3) $y = 3\log_3(\frac{1}{3}x)$ PF: _____ Trans:



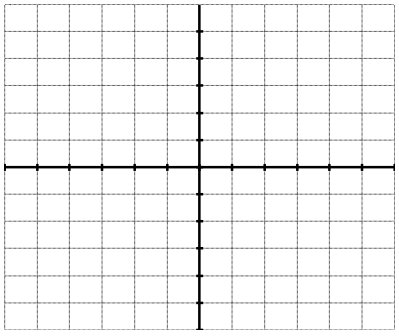
D: R:

4) $y = 2(5^{x+1})$ PF: _____ Trans:



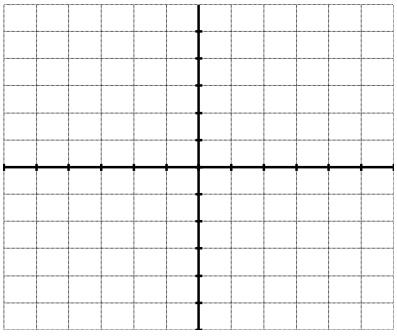
D: R:

5) $y=e^{-\frac{1}{2}x}$ PF: _____ Trans:



D: R:

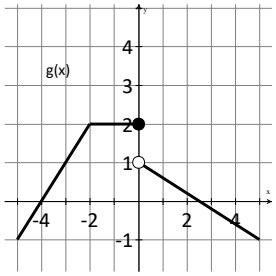
6) $y=-\frac{1}{2}\ln(x)+3$ PF: _____ Trans:



D: R:

HW 24:

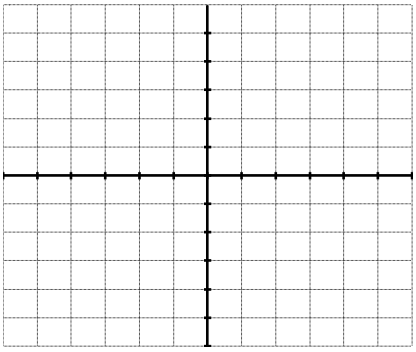
1. Given the graph for $g(x)$ below, sketch the graph of $|g(x)|$



For problems 2-5, Identify the parent function (PF) and transformations, in order, make the table and draw the graph.

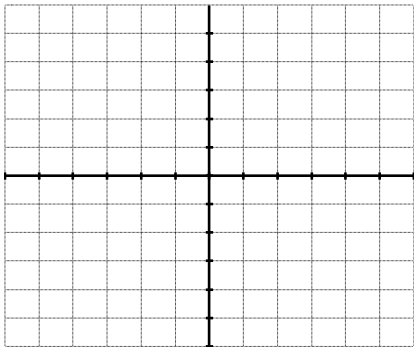
2. $y = |x^2 - 3|$ PF:

Trans:



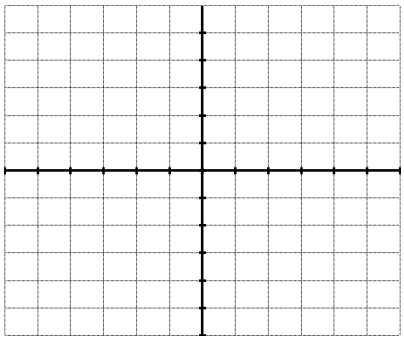
3. $y = ||x| - 3|$ PF:

Trans:



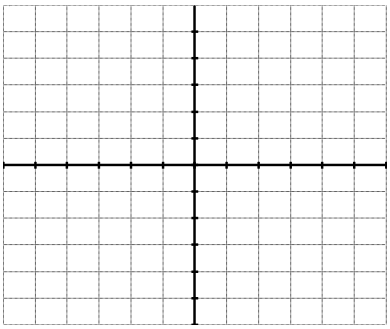
4. $y = |\sqrt{x-1} - 3|$ PF:

Trans:



5. $y = |\log_4 x - 1|$ PF:

Trans:

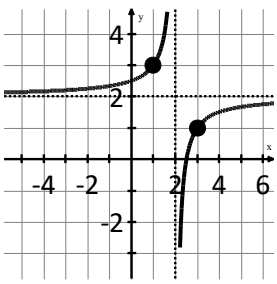


HW 25: Write the equation of each function after the given transformations.

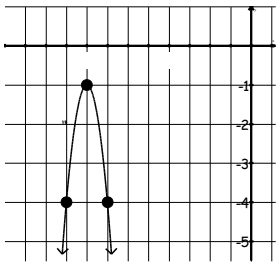
1. $f(x) = 5^x$ Horizontally stretched by a factor of 3, translated 3 units left and 4 units down.

2. $f(x) = 4^x$ reflected over the x-axis, vertically stretched by a factor of 2, and translated 1 unit left and 6 units up.

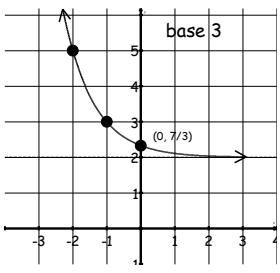
3.



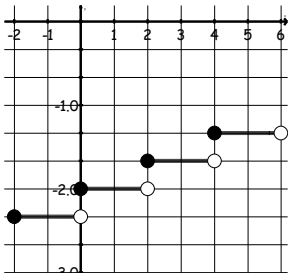
4.

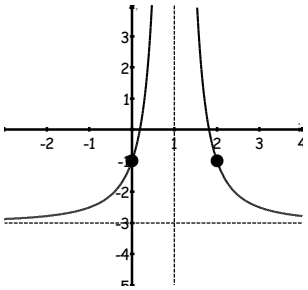


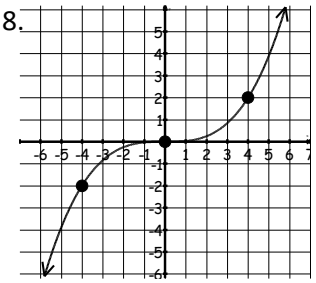
5.



Homework 25 continues on next page!

6. 

7. 

8. 

HW 26:

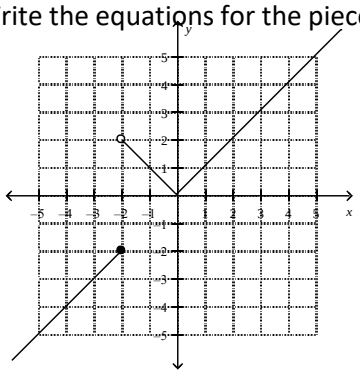
1) Graph and give domain & range: $y=\begin{cases} x^3 & x<-1 \\ \sqrt{x} & 0\le x<4 \\ 2 & x\ge 4 \end{cases}$

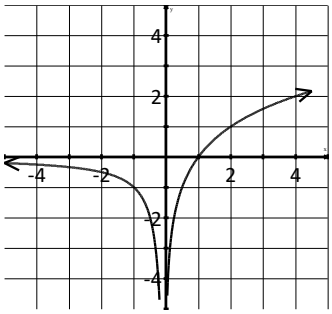
2) Graph and give domain & range: $f(x)=\begin{cases} \dfrac{1}{x^2} & x<0 \\ 3^x & x>0 \end{cases}$

3) Graph, give domain and range, then evaluate a-d given $g(x)=\begin{cases} \left(\dfrac{1}{2}x\right)^2 & x\le -2 \\ [\![x-1]\!] & -1<x<2 \\ 2^x-3 & x\ge 2 \end{cases}$

a) g(2) b) g(–4) c) g(0.5) d) g(-2)

Write the equations for the piecewise functions below:

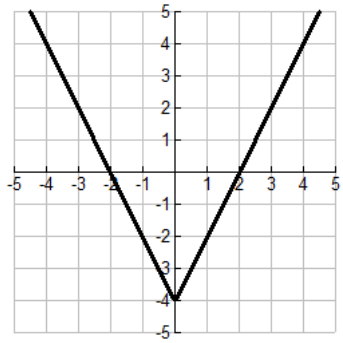
4) 

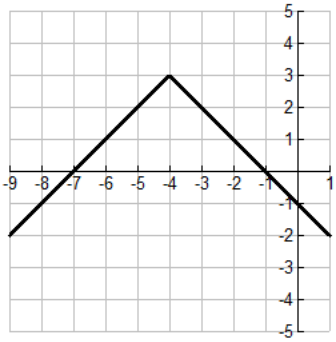
5) 

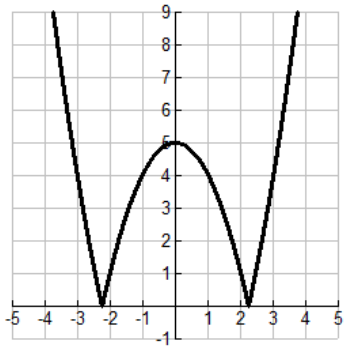
HW 27: Write these absolute value functions as piece functions:

1) $f(x)=|x-3|$ 2) $f(x)=|2x+5|$ 3) $f(x)=-2|x|+1$ 4) $h(x)=|x^2-4|$

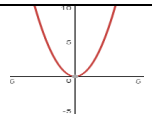
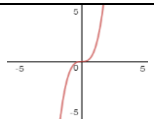
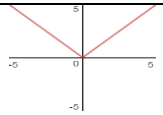
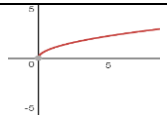
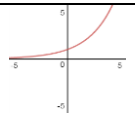
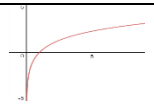
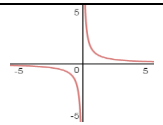
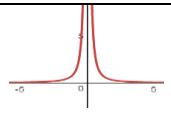
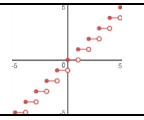
Write an absolute value function and piecewise function for each graph:

5) 

6) 

7) 

ANSWERS HW 16-18

Equation	Graph	Table of Values	Type	Domain: Range:	End Behavior/ Limit	Odd/Even	Zeroes	Asymptotes
$f(x)=x$		X | Y -1 | -1 0 | 0 1 | 1	Linear	D: (-∞, ∞) R: (-∞, ∞)	$\lim_{x\to-\infty} x=-\infty$ $\lim_{x\to\infty} x=\infty$	Odd	(0,0)	None
$f(x)=x^2$		X | Y -1 | 1 0 | 0 1 | 1	Quadratic	D: (-∞, ∞) R: [0, ∞)	$\lim_{x\to-\infty} x^2=\infty$ $\lim_{x\to\infty} x^2=\infty$	Even	(0,0)	None
$f(x)=x^3$		X | Y -1 | -1 0 | 0 1 | 1	Cubic	D: (-∞, ∞) R: (-∞, ∞)	$\lim_{x\to-\infty} x^3=-\infty$ $\lim_{x\to\infty} x^3=\infty$	Odd	(0,0)	None
$f(x)=\lvert x\rvert$		X | Y -1 | 1 0 | 0 1 | 1	Absolute Value	D: (-∞, ∞) R: [0, ∞)	$\lim_{x\to-\infty} \lvert x\rvert=\infty$ $\lim_{x\to\infty} \lvert x\rvert=\infty$	Even	(0,0)	None
$f(x)=\sqrt{x}$		X | Y 0 | 0 1 | 1 4 | 2	Square Root	D: [0, ∞) R: [0, ∞)	$\lim_{x\to0} \sqrt{x}=0$ $\lim_{x\to\infty} \sqrt{x}=\infty$	Neither	(0,0)	None
$f(x)=b^x$, $b>1$		X | Y -1 | 1/b 0 | 0 1 | b	Exponential	D: (-∞, ∞) R: (0, ∞)	$\lim_{x\to-\infty} b^x=0$ $\lim_{x\to\infty} b^x=\infty$	Neither	None	y = 0
$f(x)=\log_b x$, b > 1		X | Y -1 | b 0 | 0 1 | 1/b	Logarithmic	D: (0, ∞) R: (-∞, ∞)	$\lim_{x\to0} \log_b x=-\infty$ $\lim_{x\to\infty} \log_b x=\infty$	Neither	(1,0)	x = 0
$f(x)=\frac{1}{x}$, $x\neq0$		X | Y -1 | -1 0 | - 1 | 1	Reciprocal	D: (-∞,0) U (0, ∞) R: (-∞,0) U (0, ∞)	$\lim_{x\to-\infty} \frac{1}{x}=0$ $\lim_{x\to\infty} \frac{1}{x}=0$	Odd	None	x = 0 & y = 0
$f(x)=\frac{1}{x^2}$, $x\neq0$		X | Y -1 | 1 0 | - 1 | 1	Reciprocal Square	D: (-∞,0) U (0, ∞) R: (0, ∞)	$\lim_{x\to-\infty} \frac{1}{x^2}=0$ $\lim_{x\to\infty} \frac{1}{x^2}=0$	Even	None	x = 0 & y = 0
$f(x)=[[x]]$		X | Y -1 | -1 0 | 0 1 | 1	Greatest Integer	D: (-∞, ∞) R: Integers	$\lim_{x\to-\infty} [x]=-\infty$ $\lim_{x\to\infty} [x]=\infty$	Neither	Infinite	None

HW 18

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1) $\lim_{x\to -\infty} f(x) = -\infty$ $\lim_{x\to \infty} f(x) = \infty$ **2)** $\lim_{x\to -\infty} f(x) = 0$ $\lim_{x\to \infty} f(x) = 0$

3) $\lim_{x\to -\infty} f(x) = -\infty$ $\lim_{x\to \infty} f(x) = \infty$ **6)** $\lim_{x\to -\infty} f(x) = -\infty$ $\lim_{x\to \infty} f(x) = \infty$

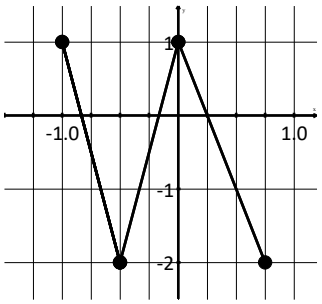
HW 19:

1) Neither **2) Even** **3) Neither** **4) Neither**

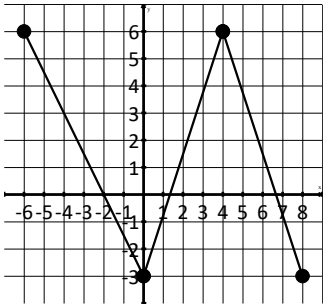
5) Even **6) Neither** **7) Even** **8) Odd** **9) Neither**

HW21

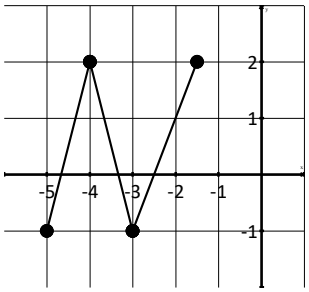
1)



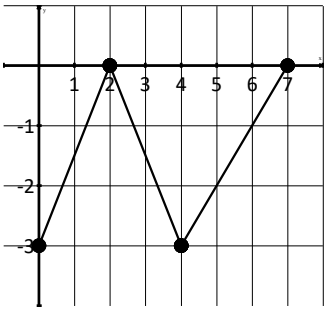
2)



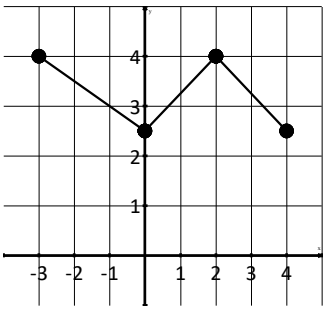
3)



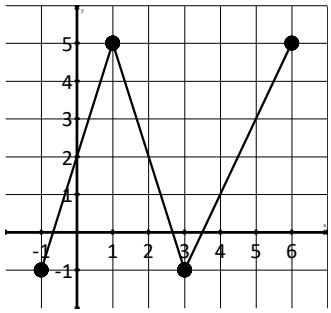
4)



5)



6)

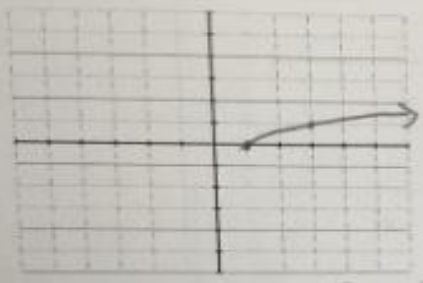


HW 20:	$f(x) = x$	$f(x) = x^2$	$f(x) = x^3$	$f(x) = \|x\|$	$f(x) = \sqrt{x}$	$f(x) = b^x$ $b > 1$	$f(x) = log_b x$ $b > 1$	$f(x) = \frac{1}{x}$	$f(x) = \frac{1}{x^2}$	$f(x) = [[x]]$
Domain: $(-\infty, \infty)$										
Range: $(-\infty, \infty)$										
Range: $[0, \infty)$										
Even function										
Odd function										
No symmetry										
Zero at $x = 1$										
y-intercept: $(0, 1)$										
$\lim_{x \to -\infty} f(x) = -\infty$										
$\lim_{x \to \infty} f(x) = \infty$										
No asymptotes										
Horiz. asymptote at $y = 0$										

HW 22:

HW 6: State the parent function, describe the transformations in a correct order, show he table of values, graph the transformed function and state the domain and range.

1) $y=\sqrt{\frac{1}{2}(x-1)}$ PF: $y=\sqrt{x}$ Trans: HS 2, Right 1

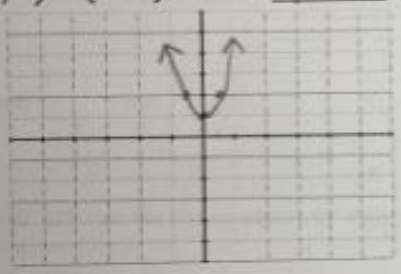


D: $[1,\infty)$ R: $[0,\infty)$

2) $y=|3x|+2$ PF: $y=|x|$ Trans: HC $\frac{1}{3}$, Up 2

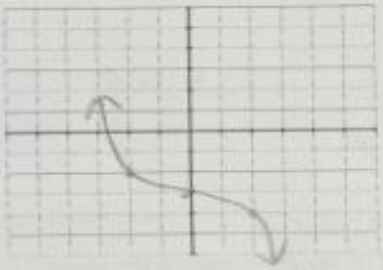
D: $(-\infty,\infty)$ R: $[0,\infty)$

3) $y=(-2x)^2+1$ PF: $y=x^2$ Trans: Flip over y, HC ½, Up 1



D: R:

4) $y=\left(-\frac{1}{2}x\right)^3-3$ PF: $y=x^3$ Trans: Flip y, HS 2, Down 3

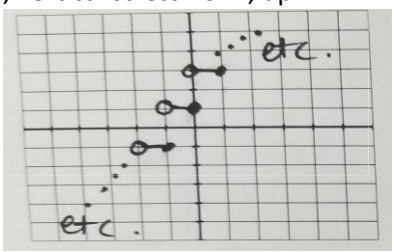


D: $(-\infty,\infty)$ R: $(-\infty,\infty)$

HW23

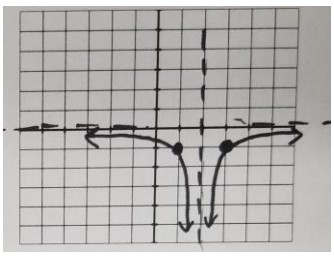
1) PF $y=[[x]]$

Reflect over the x-axis, vertical stretch of 2, up 1
Reflect over y-axis
Domain: all reals
Range: odd integers



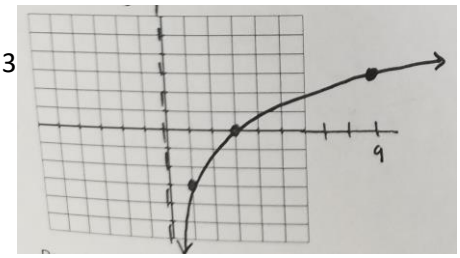
2) PF $y=\frac{1}{x}$

Reflect over x-axis, right 2
Domain: $x\neq 2$
Range: y < 0



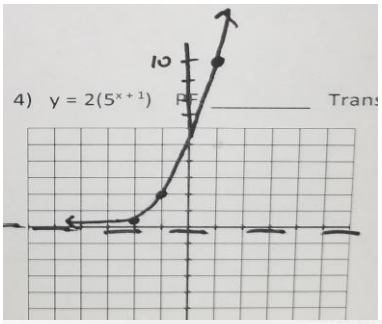
3) PF $y=\log_3 x$

Vertical stretch of 3
Domain: x > 0
Range: all reals



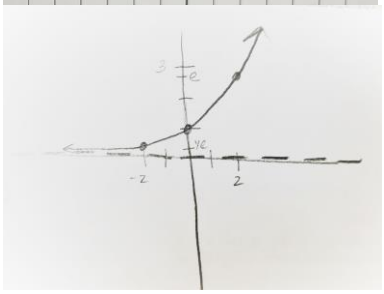
4) PF $y=5^x$

Vertical stretch of 2
Left 1
Domain: all reals
Range: y > 0



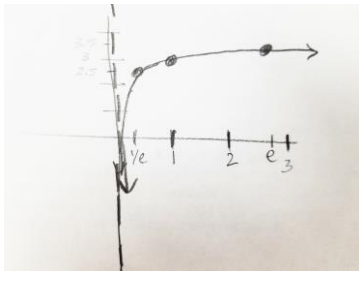
5) PF $y=e^x$

Reflect over y-axis
Horizontal stretch of 2
Domain: all reals
Range: y > 0



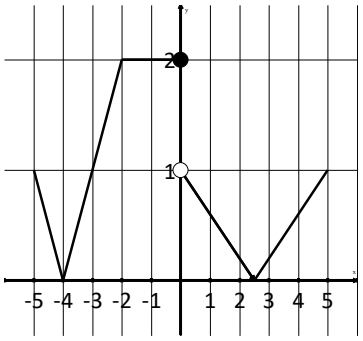
6) PF $y=\ln x$

Reflect over x-axis
Vertical compress of ½
Up 3
Domain: x > 0
Range: all reals



HW24

1)

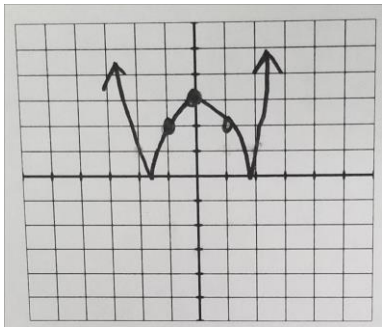


2) $y = |x^2 - 3|$

PF $y = x^2$

Down 3

Abs.val of y

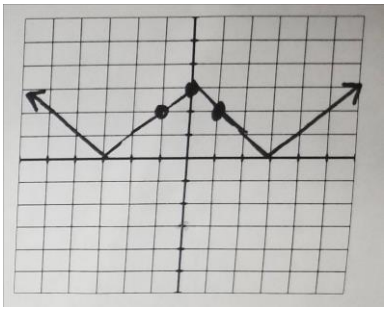


3) $y = ||x| - 3|$

PF $y = |x|$

down 3

Abs.val of y

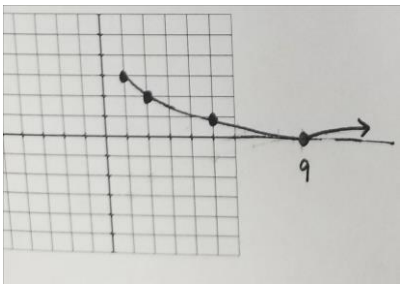


4) $y = |\sqrt{x-1} - 3|$

PF $y = \sqrt{x}$

Right 1 Down 3

Abs.val of y

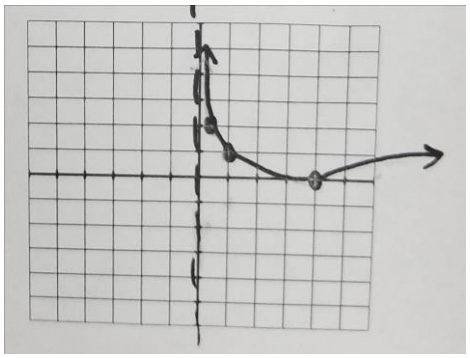


5) $y = |\log_4 x - 1|$

PF $y = \log_4 x$

down 1

abs.val of y



HW 25

1) $f(x) = 5^{\frac{1}{3}(x+3)} - 4$

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

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

4) $y = -3(x+8)^2 - 1$

5) $y = 3^{-(x+1)} + 2$

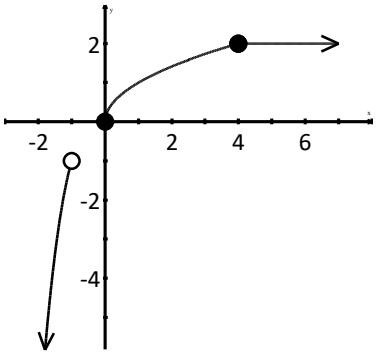
6) $y = \left[\left[\frac{1}{2}x\right]\right] - 6$

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

8) $y = 2\left(\frac{1}{4}x\right)^3$

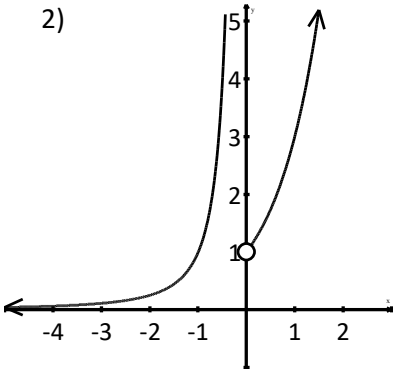
HWK 26

1)



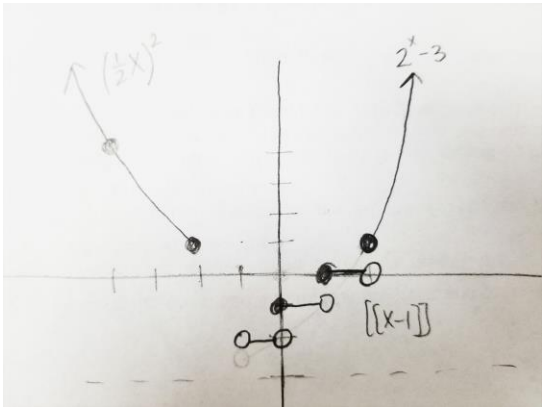
Domain: $(-\infty, -1) \cup [0, \infty)$
Range: $(-\infty, -1) \cup [0, 2]$

2)



Domain: $(-\infty, 0) \cup (0, \infty)$
Range: $(0, \infty)$

3) a) 1 b) 4
c) -1 d) 1



Domain: $(-\infty, 0\text{-}2 \cup (1, \infty)$

Range: [-2] U [-1] U [0] U $[1, \infty)$

4) $f(x)=\begin{cases} x, & x \le -2 \\ |x|, & x > -2 \end{cases}$

5) $f(x)=\begin{cases} \dfrac{1}{x}, & x < 0 \\ \log_2 x, & x > 0 \end{cases}$

HW 27

1) $f(x)=\begin{cases} -x+3, & x<3 \\ x-3, & x \ge 3 \end{cases}$

2) $g(x)=\begin{cases} -2x-5, & x<-\dfrac{5}{2} \\ 2x+5, & x \ge -\dfrac{5}{2} \end{cases}$

3) $y(x)=\begin{cases} 2x+1, & x \le 0 \\ -2x+1, & x>0 \end{cases}$

4) $h(x)=\begin{cases} x^2-4, & x \le -2 \quad or \quad x>2 \\ -x^2+4, & -2<x \le 2 \end{cases}$

a) $f(x)=2|x|-4$ or $f(x)=\begin{cases} 2x-4, & x \le 0 \\ -2x-4, & x>0 \end{cases}$

b) $f(x)=-|x+4|+3$ or $f(x)=\begin{cases} -x-1, & x \le -4 \\ x+7, & x>-4 \end{cases}$

c) $f(x)=|x^2-5|$ or $f(x)=\begin{cases} x^2-5, & x \le -\sqrt{5} \quad or \quad x>\sqrt{5} \\ -x^2+5, & -\sqrt{5}<x \le \sqrt{5} \end{cases}$