Given the parent function and a description of the transformation, write the equation of the transformed function, f(x).

1. linear → vertical stretch of 4, left 5 and down 2

$f(x) = 4(x+5)-2$

2. cubic → $r_{x\text{-axis}}$, left 1, and up 2

$f(x) = -(x+1)^3+2$

3. square root → vertical compression of $\frac{1}{2}$, right 3, and up 4

$f(x) = \frac{1}{2}\sqrt{x-3}+4$

4. quadratic → $r_{x\text{-axis}}$, vertical stretch of 2, left 3, and down 1

$f(x) = 2(x+3)^2-1$

Give the name of the parent function and describe the transformation (read left to right)

5. $h(x) = 4\sqrt{x-5}$

Parent: $P(x) = \sqrt{x}$

Transformation(s):

vertical stretch 4
right 5

6. $g(x) = 2|x - 3| + 1$

Parent: $P(x) = |x|$

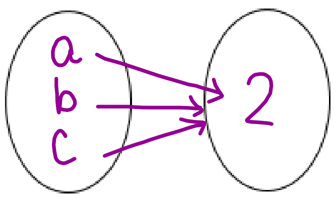
Transformation(s):

vertical stretch 2
right 3
up 1

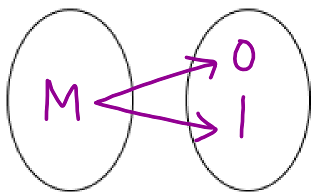
7. Given the mapping diagram:
   a. write members of the domain and range and connect them with arrows so that f is a function and f^{-1} is not a function.
   b. write members of the domain and range so that f is not a function and f^{-1} is a function.

examples

a.



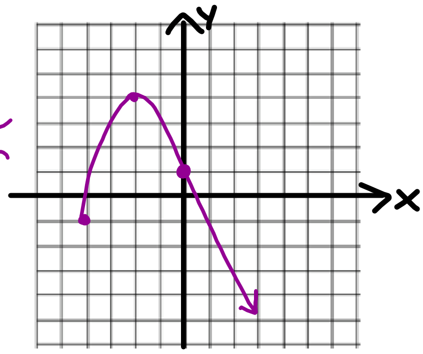
b.



8. On the accompanying graph, draw a function that has the following properties:

a. Domain: [-4, ∞]
b. Range: [-∞, 4]
c. y-intercept: (0, 1)
d. as $x \to \infty$, $y \to -\infty$

possible answer



9. Given $f(x) = 2x - 3$ and $g(x) = -x + 4$, perform the operation or composition. State domain restrictions if they exist.

a. $f(g(x)) = f(-x+4)$

$= 2(-x+4) - 3$

$= -2x+8-3$

$f(g(x)) = -2x+5$

b. $f(x) \cdot g(x) = (2x-3)(-x+4)$

$= -2x^2+8x+3x-12$

$= -2x^2+11x-12$

c. $g(x) - f(x) = (-x+4)-(2x-3)$

$= -x+4-2x+3$

$= -3x+7$

d. $\left(\frac{g}{f}(x)\right) = \frac{g(x)}{f(x)}$

$= \frac{-x+4}{2x-3}$ $\quad x \neq \frac{3}{2}$

Review Race

* There are 7 rounds
* You may divide the questions in any way you wish
* Answers go on answer sheet
* Raise your hand when done
* Everyone must participate in every round -
  if you don't "play" - you don't win a prize
* 1st done - 3 points, 2nd - 2, 3rd - 1
  (with correct answers of course)
* Submit 3 wrong answers in a round? You are disqualified for that round!

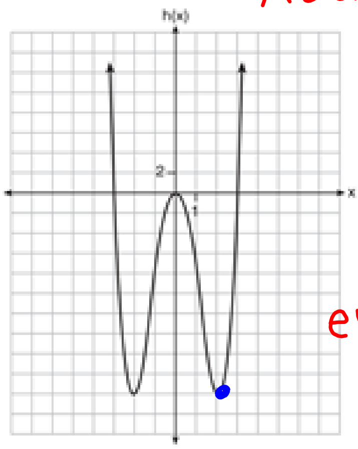
Functions f, g, and h are given below. Round 1

f(x) = x^3

$f(0) = 0$

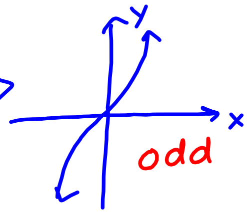
g(x) = f(x) + 1

$g(f(0)) = 0 + 1$



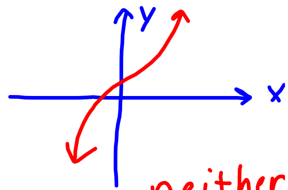
even

$f(x) \Rightarrow$



odd

$g(x) =$



neither

1. Find h(2) =-20

2. Find g(f(0)) = 1

3. Which statement is true about functions f, g, & h?
   (hint: look at graphs for f & g on your calculator)
   a. f(x) and g(x) are odd, h(x) is even
   b. f(x) and g(x) are even, h(x) is odd
   c. f(x) is odd, g(x) is neither, h(x) is even
   d. f(x) is even, g(x) is neither, h(x) is odd

* see below

4. Write an equation for k(x), the transformation of f(x) translated right 2 and up 3 $k(x) = (x-2)^3 + 3$
   (from Group work)

5. Find the domain and range for h(x) D: $(-\infty, \infty)$
   R: $[-20, \infty)$

4 from review sheet:
$r_{x\text{-axis}}$ up 1 : $k(x) = -x^3 + 1$

Given the function $f(x) = (x - 3)^3 + 1$,

Round 2

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

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

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

$y - 3 = \sqrt[3]{x-1}$

$y = \sqrt[3]{x-1} + 3$

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

2. what is the parent function and what transformation has occurred to produce f(x)?

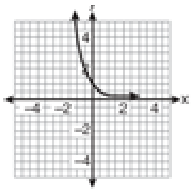
$P(x) = x^3 \rightarrow$ cubic

right 3

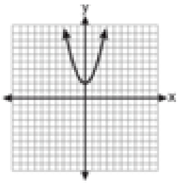
up 1

Round 3

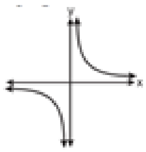
A



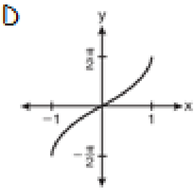
B



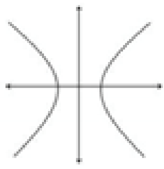
C



D



E



1. Which of the above graphs are not functions?

   E

2. Which of the graphs are 1 – 1 functions?

   A, C, D

3. Which of the graphs are even?

   B, E

4. Which of the graphs are odd?

   C, E, D

5. What is the domain and range for graph D?

   D: $[-1, 1]$

   R: $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

Given:

$f(x) = x^2 - 2x$, $g(x) = \sqrt{x+1}$, and $k(x) = x - 2$

Round 4

Find each of the following (state any restrictions where they exist):

1. $f(n+1) = n^2 - 1$

2. $g(f(4)) = 3$

3. $f(g(x)) = x + 1 - 2\sqrt{x+1}$
   $x \geq -1$

4. $\left(\frac{f}{k}\right)(x) = x$, $x \neq 2$

5. $(f+k)(x) = x^2 - x - 2$

6. $(f-k)(x) = x^2 - 3x + 2$

① $f(n+1) = (n+1)^2 - 2(n+1)$
$= n^2 + 2n + 1 - 2n - 2$
$= n^2 - 1$

② $g(f(4)) =$
$f(4) = 4^2 - 2(4) = 8$
$g(8) = \sqrt{8+1} = 3$

③ $f(g(x)) = f(\sqrt{x+1})$
$= (\sqrt{x+1})^2 - 2\sqrt{x+1}$
$= x + 1 - 2\sqrt{x+1}$

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

⑤ $f(x) + k(x) = x^2 - 2x + x - 2$
$= x^2 - x - 2$

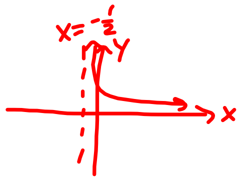
⑥ $f(x) - k(x) = x^2 - 2x - x + 2$
$= x^2 - 3x + 2$

1. Draw a function that is even
   any graph symmetrical w.r.t. x-axis   Round 5
2. Draw a function that is odd
   any graph that looks the same upside down
3. Draw a function that is 1 - 1
   any graph that passes vertical & horizontal line tests
4. Draw a function that is not 1 - 1
   passes vertical not horizontal
5. Draw a relation that is not a function but has an inverse that is a function.
   fails vertical passes horizontal

For each of the following,
a. State the type of trouble.
b. Find the domain algebraically.
c. Sketch the graph.
d. Use the graph to find the range.

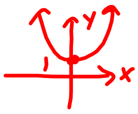
1. $f(x) = \frac{2}{\sqrt{2x+1}}$

Double Trouble
$2x+1>0$
D: $\{x \mid x > -\frac{1}{2}\}$ R: $\{y \mid y > 0\}$



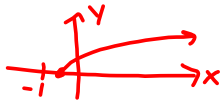
2. $g(x) = x^2 + 1$

No Trouble D: $\{x \mid x \in \mathbb{R}\}$
R: $\{y \mid y \geq 1\}$



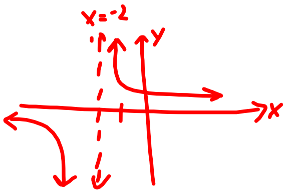
3. $h(x) = \sqrt{2x+1}$

Var under $\sqrt{}$
$2x+1 \geq 0$
D: $\{x \mid x \geq -\frac{1}{2}\}$ R: $\{y \mid y \geq 0\}$



4. $j(x) = \frac{1}{2x+4}$

var in denominator
$2x+4=0$
$x=-2$
D: $\{x \mid x \neq -2\}$ R: $\{y \mid y \neq 0\}$



Find the inverse algebraically and graphically.

Round 7

$f(x) = 3x - 2$

$x = 3y - 2$

$3y = x + 2$

$y = \frac{x+2}{3}$

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

Graphically

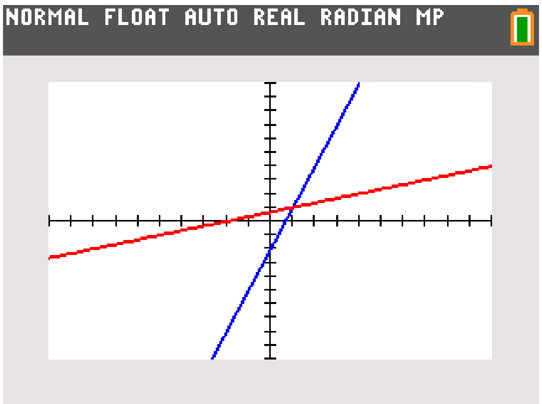
$f(x) \rightarrow$

x	-1	0	1	2
y	-5	-2	1	4

switch

$f^{-1}(x) \rightarrow$

x	-5	-2	1	4
y	-1	0	1	2



One free multiple choice answer on tomorrow's test

Prizes

You may ask one yes/no question on tomorrow's test

You will receive 3 bonus points on tomorrow's test