More on 1.4

Graphs that are not functions--You need to know these also!!

Circle

$$x^2 + y^2 = r^2$$

$$(x-h)^2 + (y-k)^2 = r^2$$

Shift right/left

Shift up/down

Side-ways parabola

$$x = y^2$$

$$x = a(y-k)^2 + h$$

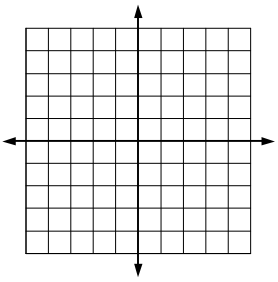
Shift up/down

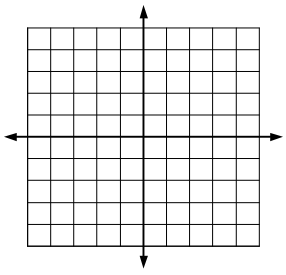
Shift right/left

Let's Graph These!!!

$x^2 + y^2 = 4$

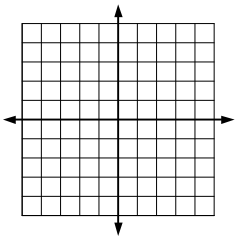
$(x-2)^2 + (y+1)^2 = 4$



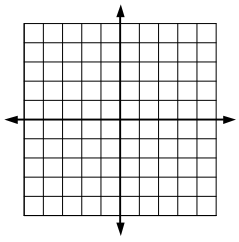


Graph $y = \sqrt{r^2 - x^2} + k$

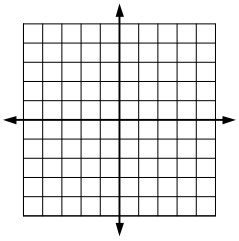
$y = \sqrt{4 - x^2} + 2$



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



$y = -\sqrt{9 - x^2} + 1$



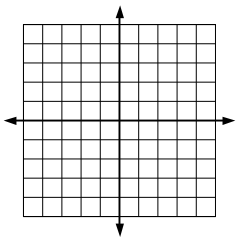
So how do I know by looking at the equation if it a function or not???

Are the following equations functions?

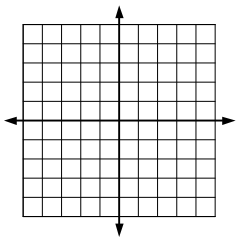
1) $x^2 + y = 4$
2) $x + y = 4$
3) $x^3 + y = 4$
4) $x + y^2 = 4$
5) $x^3y + y^2 + yx = 4$

Graph the following equations

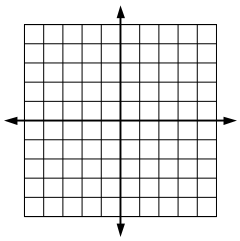
1) $2x+1=y$



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

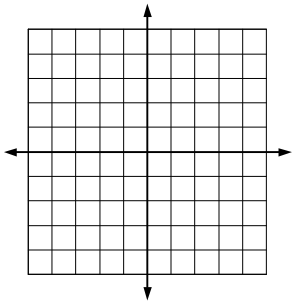


3) $2x+1=y^2$

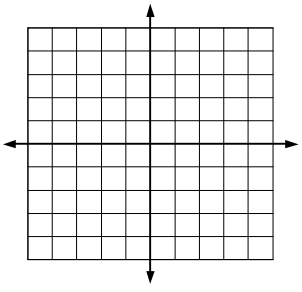


Graph

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

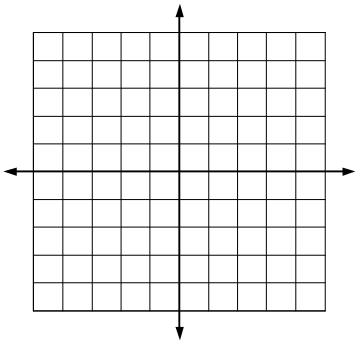


2) $y=\sqrt{(4-x^2)}-2$



Graph and evaluate.

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



2) $f(1)$

3) $f(-1)$

4) $f(0)$

5) $f(3)$

6) $f(-2)$

Evaluate the function

1) $f(x)=2x+1;\quad f(x+2)=$

2) $f(x)=2x^2+1;\quad f(c)=$

3) $f(x)=x^2+x;\quad f(x+2)=$

4) $f(x)=x^2+x;\quad f(x+h)-f(x)=$

5) $f(x)=x^2+3;\quad f(x+2)-f(2)$

Operations of functions

If $f(x)=2x-3$ and $g(x)=x^2+1$ **find a new function**

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

Difference: $f(x)-g(x)=(2x-3)-(x^2+1)=-x^2+2x-4$

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

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

Compositions

Forming a composition

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

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

$b)\ g(f(x))=g(f(x))$
$=(f(x))^2+1$
$=(2x-3)^2+1$
$=4x^2-12x+10$

Let's try some!!!!

Let $f(x) = 3x - 2$ and $g(x) = x^2 + x$, find:

1) f(g(x)) 2) g(f(x)) 3) f(f(x))

Inverse Functions

Inverse operations un-do each other.

- **What operation undoes addition?**
- **What operation undoes division?**

An inverse function undoes the operations done by the original function

- **What function would undo** $f(x) = x - 3$?
- **What function would undo** $f(x) = 2x$?

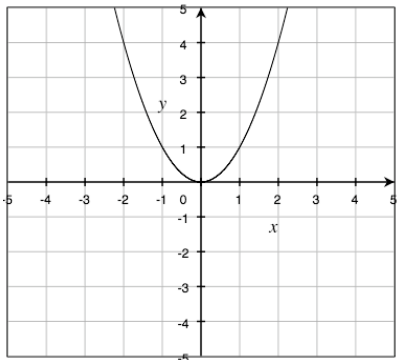
Give the inverse function for the following:

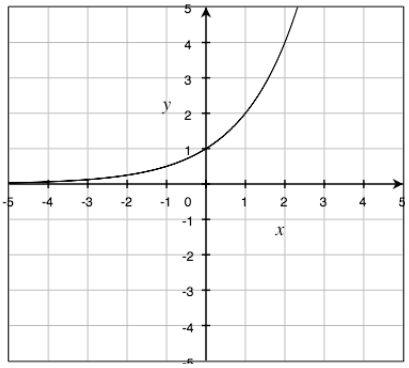
1) $f(x) = 2x - 5$ 2) $f(x) = \frac{2x}{3} + 4$ 3) $f(x) = \frac{x+4}{x-5}$

More Inverses

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

Horizontal Line test





Homework Practice

Decide whether the equation defines y as a function of x.

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

2) $x^2 + y^2 = 4$

Evaluate the function at the specified value

#21-24

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

(a) $f\left(\frac{1}{2}\right)$ (b) $f(-1)$ (c) $f(c+2)$ (d) $f(x+h)$

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

(a) $f(2)$ (b) $f(-2)$ (c) $f(x+2)$ (d) $f(x+h) - f(x)$

Given

1) $f(x) = \frac{1}{x}$ and $f(x) = x^2 - 1$ #41

a) $f(g(2))$ b) $g(f(2))$ c) $f(g(x))$ d) $g(f(x))$

Find: #35-40

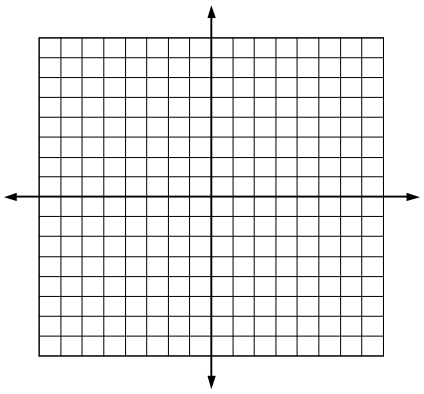
a) $f(x)+g(x)$ b) $f(x)\cdot g(x)$ c) $\frac{f(x)}{g(x)}$ d) $f(g(x))$ e) $g(f(x))$

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

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

Find the inverse function. Graph both the function and its inverse. #51-58

1) $f(x)=6-3x$ 2) $f(x)=x^3+1$ 3) $f(x)=x^{\frac{3}{5}}$



Find the domain and range for the following functions #9-16

1) $5x^3 + 6x^2 - 1$ 2) $f(x) = \dfrac{2x}{\sqrt{x+1}}$

Which of the following functions fits the data in the table below?

X	-4	-1	0	1	4
Y	-1	-1/4	0	1/4	1

#43-46

1) $f(x) = cx$ 2) $g(x) = cx^2$ 3) $h(x) = c\sqrt{x}$ 4) $r(x) = \dfrac{c}{x}$

Homework Assingment

Pg 21 #1, 5, 7-12 odd,
13-61 odd, 69, 70