



## ALGEBRA II ACTIVITY 5: WHAT IS THE INVERSE OF A FUNCTION?

### ACTIVITY OVERVIEW:

In this activity we will

- Use Draw Inverse to examine the inverse for a function.
- Compare the graphs of the original function and its inverse to  $y = x$ .
- Enter the result of finding the inverse symbolically in the  $\boxed{Y=}$  register to verify it.
- Use braces to enter the positive and negative square root to graph the inverse of a quadratic function.

Press  $\boxed{Y=}$   $\boxed{X,T,\theta,n}$  to graph the parent linear function.

```

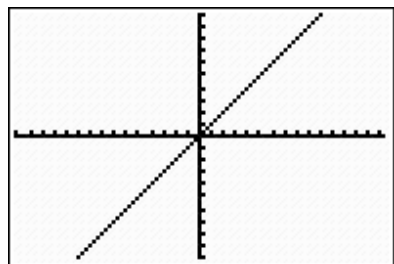
Plot1 Plot2 Plot3
\Y1=X
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
  
```

Press  $\boxed{ZOOM}$   $\boxed{5}$ .

```

ZOOM MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7↓ZTrig
  
```

This graphs  $y = x$  in a square window.

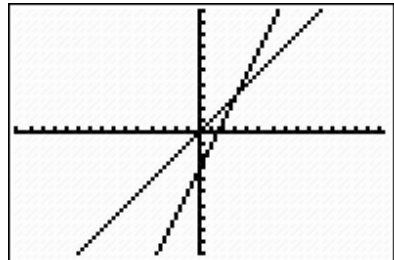


Press  $\boxed{Y=}$   $\boxed{2}$   $\boxed{X,T,\theta,n}$   $\boxed{-}$   $\boxed{3}$ .

```

Plot1 Plot2 Plot3
Y1 X
Y2 2X-3
Y3 =
Y4 =
Y5 =
Y6 =
Y7 =
    
```

Press  $\boxed{\text{GRAPH}}$ .



Next you will direct the calculator to draw the inverse for  $y = 2x - 3$ . To access the DRAW menu, press  $\boxed{2nd}$   $\boxed{\text{PRGM}}$ . Select **8: DrawInv**. This will paste the command to the home screen.

```

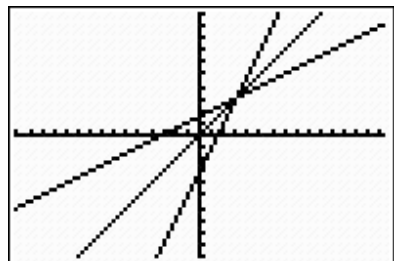
DRAW POINTS STO
5: Tangent(
6: DrawF
7: Shade(
8: DrawInv
9: Circle(
0: Text(
A: Pen
    
```

Press  $\boxed{\text{VAR}} \rightarrow$  to **Y-VARS**. Select **1:Function...** then select **2: Y<sub>2</sub>**.

```

DrawInv Y2
    
```

Press  $\boxed{\text{ENTER}}$ . Examine the inverse. What is the relationship between  $y = 2x - 3$  and its inverse?

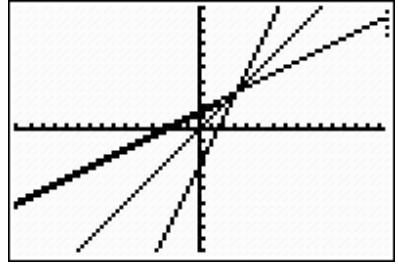


Find the inverse of  $y = 2x - 3$  by switching  $y$  and  $x$  and solving for  $y$ . Enter the result into **Y<sub>3</sub>**. Then left arrow in front of **Y<sub>3</sub>** and press  $\boxed{\text{ENTER}}$  to change the line to a thick line.

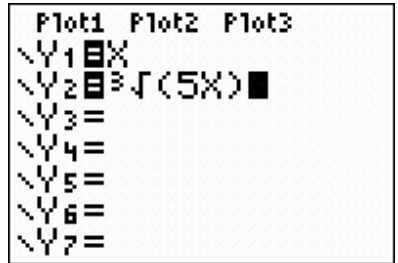
```

Plot1 Plot2 Plot3
Y1 X
Y2 2X-3
Y3 (X+3)/2
Y4 =
Y5 =
Y6 =
Y7 =
    
```

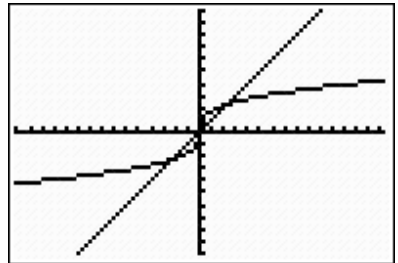
Press **GRAPH**. Observe whether  $Y_3$  graphs over the result from Draw Inverse. If it does not trace over, revisit your steps in solving for  $y$  above.



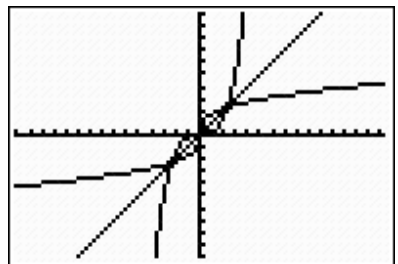
Repeat the steps above to examine the inverse of another function as shown.



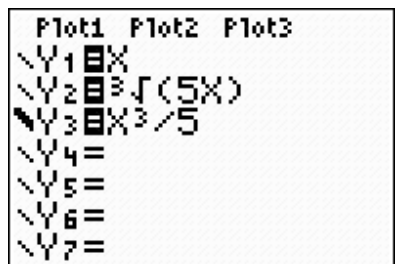
Press **GRAPH**. Examine the graph. Predict what the graph of the inverse will look like. Then press **2nd|MODE**. This will take you to the home screen. Press **2nd|ENTER**. This will recall the command to Draw Inverse. Press **ENTER**.



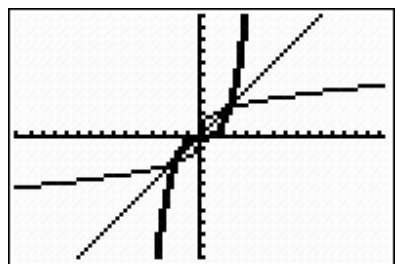
Press **ENTER**.



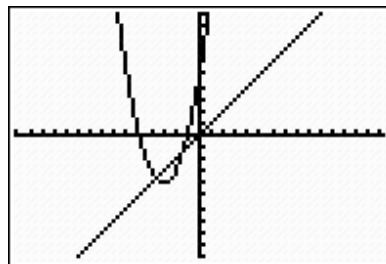
Find the inverse symbolically. Enter the result into  $Y_3$ . Then left arrow in front of  $Y_3$  and press **ENTER** to change the line to a thick line.



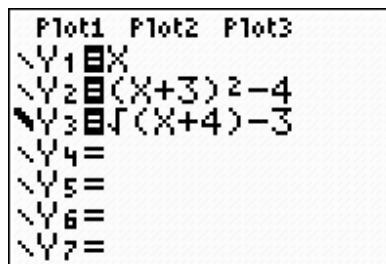
Press **GRAPH**.



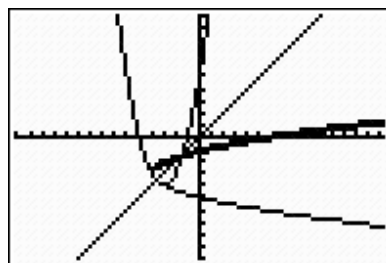
Last, find the inverse for  $y = (x + 3)^2 - 4$ .



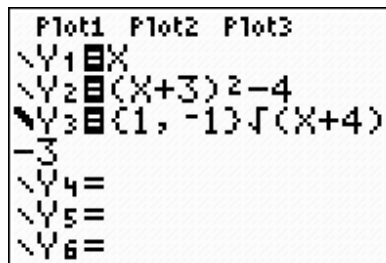
A student may come up with the result shown.



However, when graphed over the graph from Draw Inverse it is clear that the equation in  $Y_3$  only accounts for half of the graph.



To graph the inverse you need both the positive and negative square root to achieve the proper result. Use the braces as shown (by pressing  $\text{2nd}[\text{)]}$ ).



Press  $\text{GRAPH}$ . In this instance the inverse itself is not a function.

