Elaborate Inverses - Algebraically

Jacques is a French foreign exchange student. Since Celsius is the temperature scale in France, Jacques uses the function $C(F) = \frac{5}{9}(F - 32)$ (or $C = \frac{5}{9}(F - 32)$) for converting from degrees Fahrenheit, F, to degrees Celsius, C. He derived the function from the freezing point (32, 0) and the boiling point (212, 100), where each ordered pair is (F, C) or (Fahrenheit, Celsius).

1. What are the independent and dependent variables in $C = \frac{5}{9}(F - 32)$? Explain.

   Independent: _____ Dependent: _____

2. Evaluate C(90) = _____ Write the ordered pair (F, C) and explain its meaning in the context of this problem.

Now, you and Jacques are taking a trip to Paris, which uses the Celsius temperature scale. You need to write a function that will give an output of degrees Fahrenheit when using an input of degrees Celsius.

3. Now, what are the independent and dependent variables for this new function?

   Independent: _____ Dependent: _____

4. How are this function and the original function related?

5. Write the function for the new situation.

6. Substitute some values to check your function and make sure it is working.

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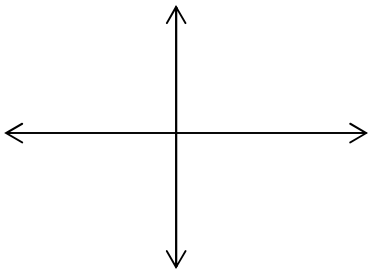
When we write an equation in terms of x and y, x is the independent variable and y is the dependent variable. Thus, the steps for finding an inverse of an equation written in terms of x and y are:

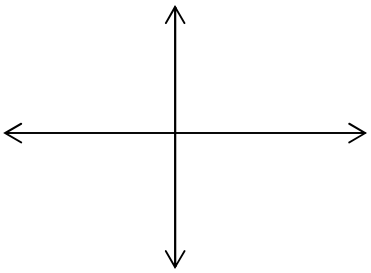
- If application problem, solve the equation for independent variable.
- If Non-application problem – switch "x" and "y", solve for y.
- You must think about Domain Restrictions to ensure that the inverse will be a function.

Domain Restrictions:

Sketch $y=x^2$



Reflect graph over $y=x$ to sketch the inverse. Is it a function?



Find the inverse function, $f^{-1}(x)$, of the following functions.

1. $f(x) = 2x^2 + 4$ with domain $x \geq 0$

2. $f(x) = 3(x - 4)^2 - 2$ with domain $x \geq 4$

3. $f(x) = \frac{1}{3}x^2 - 3$ with domain $x \geq 0$

4. $f(x) = \frac{2}{5}(x+3)^2$ with domain $x \leq -3$