Answer on Question #44020 – Engineering – Other

Find the Inverse of these Functions:

f(x)= square root x + 1

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

f(x) = 2x - 4

f(x)= (4-x) / 3+x

Solution:

Given the function $f(x)$ we want to find the inverse function, $f^{-1}(x)$.

1. First, replace $f(x)$ with y. This is done to make the rest of the process easier.
2. Replace every x with a y and replace every y with an x.
3. Solve the equation from Step 2 for y. This is the step where mistakes are most often made so be careful with this step.
4. Replace y with $f^{-1}(x)$.. In other words, we've managed to find the inverse at this point.

#1

$$f(x) = \sqrt{x} + 1$$
$$y = \sqrt{x} + 1$$

Next, replace all x's with y and all y's with x:

$$x = \sqrt{y} + 1$$

Now, solve for y:

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

Finally replace y with $f^{-1}(x)$.

$$f^{-1}(x) = (x - 1)^2, x \geq 0$$

#2

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

Next, replace all x's with y and all y's with x:

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

Now, solve for y:

$$y^2 + y - (1 + x) = 0$$
$$y = \frac{-1 \pm \sqrt{1 + 4(1 + x)}}{2}$$

Finally replace y with $f^{-1}(x)$.

$$f^{-1}(x) = \frac{-1 \pm \sqrt{5 + 4x}}{2}, x \geq -\frac{5}{4}$$

#3

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

Next, replace all x's with y and all y's with x:

$$x = 2y - 4$$

Now, solve for y:

$$2y = x + 4$$
$$y = \frac{x + 4}{2}$$

Finally replace y with $f^{-1}(x)$.

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

#4

$$f(x) = \frac{4 - x}{3} + x$$
$$y = \frac{4 - x}{3} + x$$

Next, replace all x's with y and all y's with x:

$$x = \frac{4 - y}{3} + y$$

Now, solve for y:

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

Finally replace y with $f^{-1}(x)$.

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