Answer on Question #69340 – Math – Algebra

Question

f:x ----> 3-4x-x^2, x<c
g:x ----> ln (3-x), x<3

find an expression for g^-1(x)

Solution

$g: x \to \ln(3 - x), x < 3;$

$g(x) = \ln(3 - x): \ D(x) \to E(g), D(x) = \{x < 3\}.$

Function $g(x)$ decreases monotonically because

$$g'(x) = \frac{1}{3-x} \cdot (-1) < 0, \ x < 3.$$

As function $g(x), x < 3,$ is monotonous then the inverse function $g^{-1}(x): E(g) \to D(x)$ exists, where $D(x) = \{x < 3\}.$

Let

$$y = g(x),$$

then

$$e^y = 3 - x,$$

$$x = 3 - e^y.$$

Now switch the x and the y; the new $'y = f(x)'$ will be the inverse function:

$$y = 3 - e^x;$$

Function

$$g^{-1}(x) = 3 - e^x$$

is the inverse of $g(x) = \ln(3 - x).$

Answer: $g^{-1}(x) = 3 - e^x.$