

## Answer on Question #69341 – Math – Algebra

### Question

$$f(x) = 3 - 4x - x^2, x < c;$$

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

1. find the range of the function  $f$  when  $c = 0$
2. find the largest value of  $c$  for which the composite function  $gf$  is defined.

### Solution

1.  $f(x) = 3 - 4x - x^2 = -(x^2 + 4x + 4) + 4 + 3 = -(x + 2)^2 + 7;$

So the range is  $(-\infty; 7]$  because one branch of this parabola is taken when  $x < 0$ .

2.  $g(f(x)) = \ln(3 - 3 + 4x + x^2) = \ln(x^2 + 4x)$

$$\begin{cases} x^2 + 4x > 0, \\ x < 3; \end{cases}$$

$$\begin{cases} x(x + 4) > 0 \Rightarrow x \in (-\infty; -4) \cup (0; +\infty) \\ x \in (-\infty; 3) \end{cases}$$

$$x \in (-\infty; -4) \cup (0; 3)$$

The largest value of  $c$  for which the composite function  $g \circ f(x) = g(f(x))$  is defined will be  $c = 3$ .

**Answer: 1.**  $(-\infty; 7]$ ; **2.**  $c = 3$ .