

**Problem 1.** Assume  $f$  is a one-to-one function. If  $f(98237402) = -127562345$ , what is  $f^{-1}(-127562345)$ ? (2 points)

**Solution.** Clearly,  $f^{-1}(-127562345) = 98237402$ . (Hyperbole intentional)

**Problem 2.** Use the Inverse Function Property to show that  $f$  and  $g$  are inverses of each other:

- $x^2 - 9$ , ( $x \geq 0$ )
- $\sqrt{x+9}$ , ( $x \geq -9$ )

(3 points)

**Solution.** We must show that  $f(g(x)) = x$  and  $g(f(x)) = x$ . Indeed, we have

$$f(g(x)) = (\sqrt{x+9})^2 - 9 = x + 9 - 9 = x$$

and

$$g(f(x)) = \sqrt{(x^2 - 9) + 9} = \sqrt{x^2} = x.$$

**Problem 3.** Find the inverse function of  $f$

$$f(x) = 9 + \sqrt{x}$$

(5 points)

**Solution.** Let  $f(x) = y$ , so that

$$y = 9 + \sqrt{x}$$

we switch  $x$  and  $y$ :

$$x = 9 + \sqrt{y}$$

and solve the equation for  $y$ :

$$\begin{aligned}x - 9 &= \sqrt{y} \\(x - 9)^2 &= y\end{aligned}$$

Hence,

$$f^{-1}(x) = (x - 9)^2 = x^2 - 18x + 81.$$