

January 28, 2001

Problem 1. Given $f(x) = (x - 1)^2$ and $g(x) = 3x + 1$:

a) Find the domain and the rule for the new function $h(x) = f(g(x))$

b) Explain why $f(x)$ is not invertible.

Problem 2: The population of SmallTown in the year t is given by the formula $p(t) = \frac{50}{1+0.1t}$, where t represents years after 1900 and $p(t)$ is measured in thousands of people.

a) Find a formula for the inverse function p^{-1} .

b) Explain in words what $p^{-1}(40)$ gives you. (Do not compute its value).

c) When was the population of SmallTown 20,000 people ?

Suppose a given town population of p thousand people generates a tax revenue R given by the formula $R = g(p) = -0.1(p - 50)^2 + 800$, where R is measured in thousand of dollars.

d) What was the tax revenue in SmallTown in the year 1980 ?

e) Find a formula for function $h(t)$ that gives the tax revenue generated by smallTown t years after 1900.