

Math 1A

Quiz 2 - September 9, 2009

Name: Key

1. (a) (2 pts) Find the inverse of the function $f(x) = 1 - \sqrt{10 - 3x}$.

Let $y = f(x)$. Switching the roles of x and y , we obtain, $x = 1 - \sqrt{10 - 3y}$, or $(1 - x) = \sqrt{10 - 3y}$. Squaring both sides yields $(1 - x)^2 = 10 - 3y$, and solving for y yields

$$f^{-1}(x) = y = \frac{10 - (1 - x)^2}{3}.$$

- (b) (3 pts) What are the domain and range of $f^{-1}(x)$?

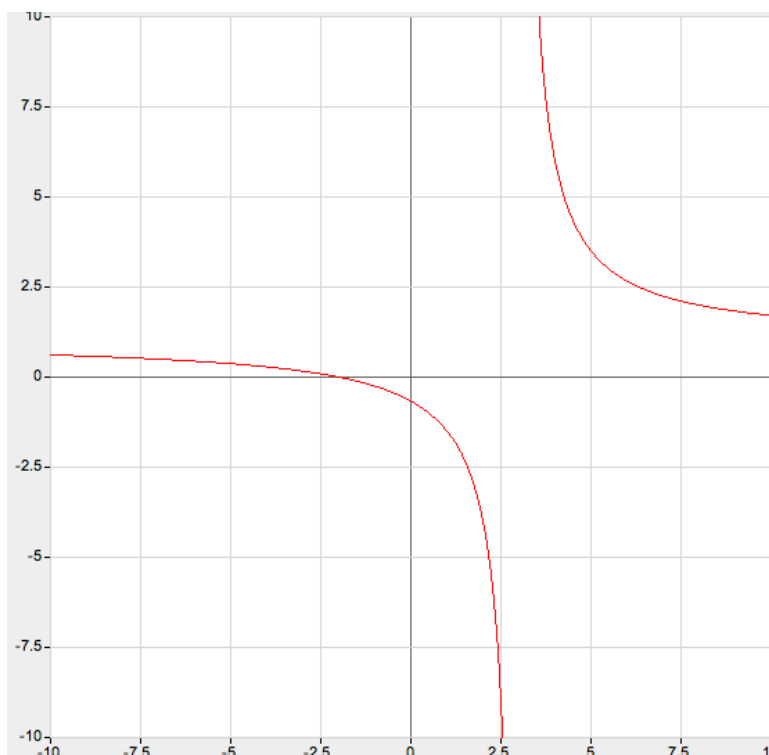
We begin by computing the domain and range of the original function $f(x)$. The domain will be all numbers x such that $10 - 3x \geq 0$, or $(-\infty, 10/3]$. Since $f(10/3) = 1$ and $f(-\infty) = -\infty$ the range is $(-\infty, 1)$. Now the domain and range of $f^{-1}(x)$ are the opposite of the domain and range for $f(x)$. So we have $D = (-\infty, 1]$, $R = (-\infty, 10/3]$.

2. (2pts) Draw the graph of a function that has no inverse and briefly explain why not.

Any picture that doesn't satisfy the horizontal line test will work. Such a function has no inverse because it is not one to one.

3. (3 pts) Sketch a graph of the function $f(x) = \frac{x + 2}{x - 3}$.

(HINT: Does the function have asymptotes? Does it have zeros? What is $f(1 \text{ million})$ close to?)



Key points are the zero at $x = -2$, the asymptote at $x = 3$ and the line $y = 1$ as a horizontal asymptote.