Math 120F
October 23, 1997
Quiz #4 (20 points)

Name _____

TA section (Circle one): FA FB FC FD

Instructions: You have 30 minutes for this quiz. You **MUST** show work for credit. If in doubt, ask for clarification.

1. (7 points) We have a function $y = f(x)$ such that the domain of f is $1 \leq x \leq 6$ and the range of f is $-3 \leq y \leq 5$.

   (a) What is the domain of $f(2(x-3))$?

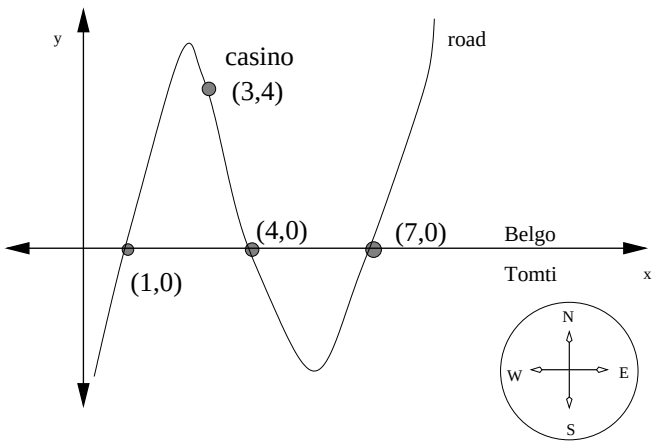
   (b) What is the range of $f(2(x-3))$?

   (c) What is the domain of $2f(x) - 3$?

   (d) What is the range of $2f(x) - 3$?

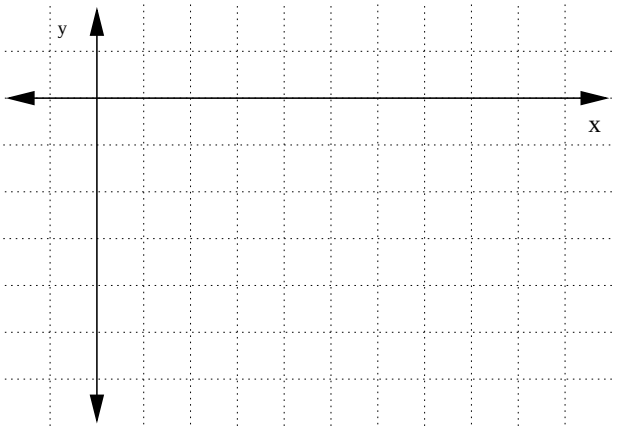
   (e) If $f(x)$ is one-to-one on it's domain, what will the domain of $f^{-1}(y)$ be ?

2. The country of Belgo lies to the north of Tomti. In the picture to the right, the x-axis is the border between the two countries. There is a road that winds in and out of the countries and the road can be described as a cubic polynomial $y = f(x)$. Belgo has legalized gambling and Hooray's Casino is located at $(3, 4)$. Assume units are measured in miles.



   (a) (4 points) Explicitly determine $y = f(x)$.

(b) (1 points) After a brief dispute, the border between the two countries is redrawn parallel to the old border, and passing through Hooray's Casino. In the coordinate system to the right, assume the x-axis is the new border, so that the casino is now located at $(3, 0)$. Sketch where the road will be with respect to this coordinate system.



(c) (2 points) With respect to the new coordinate system, the road will now be described by a new cubic polynomial, $y = g(x)$. How is $g(x)$ related to $f(x)$?

(d) (2 points) Express $g(x)$ in the form $y = ax^3 + bx^2 + cx + d$.

(e) (4 points) A new casino called The Ostrich is being built on the road directly to the east of Hooray's casino, so that it will lie on the new border. What will the coordinates of this new casino be?