

**MTHT 530 Analysis for Teachers II**  
Problem Set 6

Do Problem 22 from Chapter 12 of Spivak's *Calculus*.

- 1) Let  $f(x) = x^2 - x - 1$ . Let  $x_0 = \frac{3}{2}$ . Use Newton's Method to calculate approximations  $x_1, x_2, x_3$ . Compare this to the actual value of the unique positive  $\alpha$  with  $f(\alpha) = 0$ .
- 2) Let  $f(x) = x^3 + 3x - 1$ .
  - a) Prove that  $f$  is increasing on  $\mathbb{R}$ .
  - b) Find  $(f^{-1})'(3)$ . [Note  $f(1) = 3$ .]
- 3) The function  $\tan x$  is one-to-one on  $(-\frac{\pi}{2}, \frac{\pi}{2})$ . Let  $\arctan$  be the inverse. Find a formula for  $\arctan'(x)$ .