Math 300A&B Introduction to Mathematical Reasoning Fall 2009

Assignment #8: Due Friday, 12/4/09 (NEW DUE DATE)

Part I:

1. Eccles, pages 113–114, Exercises 9.1, 9.2, 9.4.
2. Eccles, page 118, Problem 18.
3. For each of the functions below, answer the following questions, and *prove your answers correct*.
   - Is the function injective?
   - Is the function surjective?
   - If the function is not surjective, what is its image?

   (a) $f\colon \mathbb{R} \to \mathbb{R}$, defined by
   $$f(x) = x^2 - 4x + 5.$$

   (b) $g\colon \mathbb{R} - \{-1\} \to \mathbb{R}$, defined by
   $$g(x) = \frac{x+3}{x+1}.$$

   (c) $h\colon \mathbb{R}^+ \to \mathbb{R}$, defined by
   $$h(x) = \begin{cases} \dfrac{1-x}{x}, & \text{if } 0 < x \leq 1, \\ 1-x, & \text{if } x \geq 1. \end{cases}$$