Math 347: Homework # 6

Due Friday, 2 March 2018 in class

Your solutions will be graded according to both correctness and clarity. In writing your proofs, fully explain all the important steps. Use full and grammatically correct English sentences. Be clear and concise. You may need to rewrite your proofs multiple times on scratch paper before submitting your final solution, so that it is as clear and concise as possible.

Exercise numbers are from the end-of-chapter exercises in the 2nd edition of Mathematical Thinking: Problem-Solving and Proofs by D’Angelo and West.

1. (5 points) 3.38

2. (5 points) 3.55

3. (5 points) 3.65

4. (5 points) Let $f : \mathbb{R} \to \mathbb{R}$ be the function defined by

$$f(x) = \frac{x^2}{1 + x^2}.$$ 

Find the image of $f$, and prove that it is the image of $f$.

5. (5 points) Let $f : \mathbb{R} \to \mathbb{R}$ be the function defined by

$$f(x) = 3x - 2|x - 2| - 6.$$ 

Prove that $f$ is a bijection. Find the inverse function.