HOMEWORK 5

Due on Friday, October 30th, in class.

Exercise 1. (20 points) Solve exercises 11.3 and 11.5 from the textbook.

Exercise 2. (60 points) Solve exercises 12.4, 12.8, 12.9, 12.10, 12.13, and 12.14 from the textbook.

Exercise 3. (20 points) Let $\alpha > 1$ and define the sequence $\{x_n\}_{n\geq 1} \subseteq \mathbb{R}$ as follows:

$$x_1 > \sqrt{\alpha} \quad \text{and} \quad x_{n+1} = \frac{x_n + \alpha}{x_n + 1} \quad \text{for all } n \geq 1.$$

1) Show that $\{x_{2n-1}\}_{n\geq 1}$ is decreasing and that $\{x_{2n}\}_{n\geq 1}$ is increasing.
2) Show that the sequence $\{x_n\}_{n\geq 1}$ converges to $\sqrt{\alpha}$.