

HOMEWORK 5

Due on Friday, October 28th, 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(b), 12.10, 12.13, and 12.14 from the textbook.

Exercise 3. (20 points) Let $\alpha > 1$ and define the sequence $\{x_n\}_{n \geq 1}$ of real numbers 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 bounded below by $\sqrt{\alpha}$.
- 2) Show that $\{x_{2n}\}_{n \geq 1}$ is increasing and bounded above by $\sqrt{\alpha}$.
- 3) Show that the sequence $\{x_n\}_{n \geq 1}$ converges to $\sqrt{\alpha}$.