Directions: You can collaborate, but should list those you worked with and write up the solutions independently (i.e., not copying but thinking them through by yourself).
Consulting internet solutions or solutions to problem sets of previous semesters is not allowed.
When used significantly, cite theorems by name or number to justify statements or implications.

Reading: Chapter 5.1-.3, 5.5  Limit theorems.
Algebraic theorems (review);
Inequality theorems: Squeeze Theorem, Location Theorems.

Problem 1. (3: 1,1,1)
Work the following Exercises (at the end of Chapter 5) involving the Sequence Location Theorem, 5.3B.

a) 5.3/1 (various possible versions of Theorem 5.3B, when \( L = 0 \)).
Try to decide T or F without consulting the Theorem; you can use it later as a partial check on your answers.

b) 5.3/2  Prove: \( \lim a_n > M \Rightarrow a_n > M \) for \( n \gg 1 \) (half of the Sequence Location Theorem).
Try to do this without looking at the proof of the other half given in the book. Use a direct argument, i.e., not contraposition or indirect proof.

c) 5.3/5  Prove: \( \lim a_n = L \Rightarrow \lim |a_n| = |L| \).
There are three cases, according to the sign of \( L \); the proof for \( L = 0 \) is different from the other two.

Problem 2. (2) Work 5.2/4
Use the hint. The work on page 9 gives an even closer picture to what you do here; the difference now is that the Squeeze Theorem requires both an upper and lower estimate, not just a lower estimate.
You'll need the second part of the hint when you apply the Squeeze Theorem.

After you do part (b), check your work by reading the boxed warning on page 410.

Use and cite the theorems in 5.3 and 5.1.

Problem 5. (1) Work P5-1a (Problem 1a at the end of Chapter 5.)
If you are not using the current printing (the 8th), the third line needs two corrections; read: “Let \( \sqrt{a_n} \to M \)” and “\( a_n \to M^2 \)”.