

18.100A PROBLEM SET 1

due February 15th 9:30 am

You can collaborate with other students when working on problems. However, you should write the solutions using your own words and thought.

Problem 1. Show that the sequence $\{(-1)^n\}_{n \geq 1}$ is bounded above and below, and it does not have a limit.

Problem 2. Show that the sequence $\left\{\frac{n-1}{3^n}\right\}_{n \geq 2}$ is strictly decreasing.

Problem 3. Exercise 2.1.4 page 30.

Problem 4. Prove that the sequence $a_n = \frac{2^{2n}(n!)^2}{(2n+1)!}$ has a limit.

Problem 5. Show that the sequence $a_n = 1 + \frac{1}{3} + \frac{1}{5} + \cdots + \frac{1}{2n-1}$ is not bounded above.

Problem 6. Let $\{a_n\}$ and $\{b_n\}$ be increasing. Is the sequence $\{a_n^2 + b_n^2\}$ increasing? Proof or counterexample.

Problem 7. Problem 2-4 page 32.

Problem 8. Exercise 3.1.1 (b), (c), (e) Page 46.

Problem 9. Exercise 3.2.3 Page 46.

Problem 10. Exercise 3.4.2 Page 47.