Math 2300-013: Quiz 5

Name: _____   Score: _____

Collaborators:

Directions: This take-home quiz will be due at the beginning of class on Monday, October 9. You may use your notes, textbook, and colleagues from our class as resources, but your final write-up should be in your own words. If you work with collaborators from our class, please include their names on this quiz.

1. Determine if the sequence converges or diverges. If it converges, find the limit.

   (a) $a_n = \left(1 + \dfrac{5}{n}\right)^{3n}$

   (b) $a_n = \dfrac{n^2 \cos(n)}{1 + n^2}$

(c) $a_n = \sqrt[n]{3^n + 5^n}$

(d) $a_n = \ln(2n^2 + 1) - \ln(n^2 + 1)$

2. A sequence a_n is given by $a_1 = \sqrt{2}$, $a_{n+1} = \sqrt{2 + a_n}$.

  (a) Show that $\{a_n\}$ is increasing and bounded above by 3.

  (b) Does $\{a_n\}$ converge or diverge? (Hint: use the Monotone Sequence Theorem)

  (c) Find $\lim\limits_{n \to \infty} a_n$.