Rutgers University
Math 152

Section 10.1: Sequences - Worksheet

1. Determine if the sequences below converge or diverge. In case of convergence, find the limit.

(a) $a_n = \dfrac{\sqrt{1 + 16n^4}}{n^2 + 1}$

(b) $a_n = \dfrac{5n + 4}{2\cos(n)^2 + 3n}$

(c) $a_n = \tan^{-1}\left(1 - \sqrt{n}\right)$

(d) $a_n = \dfrac{n + (-1)^n}{n^3 + 1}$

(e) $a_n = \dfrac{4^n - 5^{2n}}{7^n}$

(f) $a_n = \cos\left(\dfrac{5}{\sqrt{n}}\right)^n$

(g) $a_n = \left(\dfrac{n + 5}{n + 3}\right)^{4n}$

(h) $a_n = (2n + 1)^{3/n}$

(i) $a_n = \sin(n\pi)e^n$

2. Suppose that a_n is a sequence defined inductively by

$$\begin{cases} a_1 = 2, \\ a_{n+1} = \dfrac{5}{a_n + 4} \quad \text{for } n \geqslant 1. \end{cases}$$

(a) Find the first 4 terms of the sequence $\{a_n\}$.

(b) The sequence $\{a_n\}$ converges. Find its limit.