

Homework for Math 352
Spring 2020

Hwk Set 4. Due Monday, February 3.

1. Starting from the definition of the limit of a sequence, give a formal proof of each of the following.

(a) $\lim_{n \rightarrow \infty} \frac{3}{2n+1} = 0.$

(b) $\lim_{n \rightarrow \infty} \frac{3n}{n+1} = 3.$

(c) $\lim_{n \rightarrow \infty} \frac{n}{n^2+1} = 0.$

2. Determine for each sequence whether it converges to a real number, diverges to $\pm\infty$ or if the limit does not exist. If it converges to a real number find the limit. Prove all your claims citing theorems in the textbook.

(a) $a_n = \sqrt{\frac{n+1}{4n+7}}.$

(b) $b_n = \frac{3n+5}{n^2+1}.$

(c) $c_n = (-1)^n a_n.$

(d) $d_n = (-1)^n b_n.$

(e) $e_n = n - \sqrt{n^2 + n}.$

(f) $f_n = \frac{n^2+n+1}{7n+23}.$