## MATH 152, Fall 2019

## Worksheet 6

1. Find the limit of the sequence.

$$
\{\sqrt{2}, \sqrt{2 \sqrt{2}}, \sqrt{2 \sqrt{2 \sqrt{ } 2}}, \cdots\}
$$

2. Show that the sequence defined by

$$
a_{1}=2 ; \quad a_{n+1}=\frac{1}{3-a_{n}}
$$

satisfies $0<a_{n} \leq 2$ and is decreasing. Deduce that the sequence is convergent and find its limit.
3. Let $\left\{a_{n}\right\}$ be the sequence defined by

$$
a_{n}=\frac{\sqrt{n+1}}{5 n+3}
$$

Determine if the sequence is increasing/decreasing/not monotone.
4. Determine whether the following sequences are convergent or not. In the case, a sequence is convergent, then find its limit.
a) $a_{n}=\left\{\sqrt{\frac{1+4 n^{2}}{1+n^{2}}}\right\}$
b) $\quad a_{n}=\left\{\frac{2}{\sqrt{n^{3}+n}}\right\}$
c) $a_{n}=\left\{\frac{(2 n-1)!}{(2 n+1)!}\right\}$
5. Using the integral test determine if the following series is con vergent or divergent.

$$
\sum_{n=2}^{\infty} \frac{1}{n \ln ^{2}(n)}
$$

6. Determine whether the following series is convergent or not. If it is convergent, then find its Sum.

$$
\sum_{n=1}^{\infty} \frac{1}{1+\left(\frac{2}{3}\right)^{n}}
$$

