

MATH 349
Handout # 1

A

1. For the sequence $a_n = \frac{e^n}{1 + 3^n}$ find the limit, an upper bound and a lower bound, if they exist.
2. Show that $\left\{\frac{2^n}{n!}\right\}_{n=1}^{\infty}$ is monotonic and bounded. Can you find the limit?
3. Give an example of a sequence
 - (a) which is unbounded above and not monotonic;
 - (b) bounded and divergent.

B

1. Show that the sequence $a_n = \frac{n!}{n^n}$ is monotonic and bounded. Find the limit.
2. Find the limit, an upper bound and a lower bound of $a_n = \sqrt{n^2 - \frac{n}{3}} - n$, if they exist
3. Give an example of a sequence
 - (a) which is increasing and convergent to 0;
 - (b) which is alternating and unbounded.

C

1. Is the sequence $a_n = \frac{n + (-1)^n}{4^n}$ monotonic, bounded, alternating, convergent?
2. Find the limit of $a_n = \frac{n}{2^n + 10}$.
3. Give an example of a sequence which is divergent and bounded.

D

1. Decide if the sequence $a_n = n - 2^n$ is convergent, bounded, and monotonic?
2. Find the limit of $b_n = (n + 1)^{\frac{1}{n}}$. Is the sequence monotonic?
3. Give an example of a sequence
 - (a) which is increasing and bounded;
 - (b) which is convergent to 3 and non-monotonic.