

People's Democratic Republic of Algeria
Ministry of Higher Education and Scientific Research

University of Batna 2
Faculty of Technology

Common Core of Science and Technology
Engineering Section

Module: Calculus 1 (Analyse 1)

Tutorial Session N°2

Exercise n°1

Identify the pattern of the following sequence.

$$1, 1, 2, 3, 5, 8, 13, \dots$$

Exercise n°2

Write out the first four items of the sequences whose general terms are:

a. $a_n = 2n + 1$

b. $a_n = \frac{3}{n+1}$

c. $a_n = \frac{n+1}{n}$

d. $a_n = \frac{1}{n^2}$

Exercise n°3

What is the limit of the following sequences, and determine whether they converge or diverge?

a. $a_n = \frac{2n}{n+1}$

b. $a_n = 3 + (-1)^n$

c. $a_n = \frac{2^n}{2^{n-1}}$

d. $a_n = \frac{(-1)^n}{n!}$

e. $a_n = \frac{5n+7}{3n-5}$

f. $a_n = \frac{n^2+1}{2n-3}$

Exercise n°4

Identify the type of the following sequences.

a. $a_n = 2n + 3$

b. $a_n = 2^n$

Exercise n°5

Generate the general term of the following sequence.

$$-\frac{1}{1}, \frac{3}{2}, -\frac{7}{6}, \frac{15}{24}, -\frac{31}{120}, \dots$$

Exercise n°6

Find the general term of the following sequence.

Given the function $f(x) = e^{\frac{x}{3}}$ $a_n = f^{(n-1)}(0)$

Exercise n°7

Applying l'Hôpital's rule, evaluate $\lim_{n \rightarrow \infty} \frac{(n+1)}{e^n}$

Exercise n°8

Applying the squeeze theorem, determine the convergence or divergence of the following sequences:

a. $a_n = \frac{\sin n}{n^2}$

b. $a_n = (-1)^n \cdot \frac{1}{n}$

c. $a_n = \frac{n!}{n^n}$

Exercise n°9

Investigate whether the following sequences are increasing, decreasing or neither.

a. $a_n = \frac{n}{n+1}$

b. $a_n = \frac{n!}{e^n}$, for $n \geq 2$

Exercise n°10

Show that the following sequence is bounded.

$$a_n = \frac{3 - 4n^2}{n^2 + 1}$$