People's Democratic Republic of Algeria
Ministry of Higher Education and Scientific Research
University of Batna 2 — Common Core of Science and Technology
Faculty of Technology — Engineering Section
Module: Calculus 1 (Analyse 1)

Tutorial Session N°4

Exercise n°1

Find the linear approximation of the function $f(x) = \sqrt{x+3}$ at $c = 1$ and use it to approximate the numbers $\sqrt{3.98}$ and $\sqrt{4.05}$. Are these approximations overestimates or underestimates.

Exercise n°2

Find the Taylor polynomial of degree 1 for $g(x) = cosx$, with x in radians, for x near 0.

Exercise n°3

a. use the linear approximation to approximate $f(x) = \frac{1}{x}$ for x near $c = 2$, and estimate $f(2.04)$.
b. use the linear approximation to approximate $f(x) = \sqrt[3]{x}$ for x near $c = 8$, and estimate $f(8.05)$.
c. use the linear approximation to approximate $f(x) = \ln x$ for x near $c = 1$, and estimate $f(1.03)$.

Exercise n°4

Find the Taylor polynomial of degree 1 for $g(x) = cosx$, with x in radians, for x near 0, and use it to approximate $g(0.05)$, $g(-0.1)$, and $g(0.4)$.

Exercise n°5

Find the quadratic approximation to $g(x) = cosx$ for x near 0.

Exercise n°6

Construct the Taylor polynomial of degree 7 approximating the function $f(x) = sinx$ near 0. Compare the value of the Taylor polynomial approximation with the true value of $f(x)$ at $x = \frac{\pi}{3}$.

Exercise n°7

Graph the polynomial of degree 8 approximating $g(x) = cosx$ for x near 0.

Exercise n°8

Construct the Taylor polynomial of degree 10 about $x = 0$ for the function $f(x) = e^x$.

Exercise n°9

Construct the Taylor polynomial of degree 4 approximating the function $f(x) = \ln x$ for x near 1.

Exercise n°10

Approximate $e^{-0.75}$ using a 4th degree polynomial and determine the max error.

Exercise n°11

For what values of x is the linear approximation $\sqrt{x+3} \approx \frac{7}{4} + \frac{x}{4}$ accurate to within 0.5. What accuracy to within 0.1.