

المسئله:	رقم السكشن:	اسم الطالب:
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Instructions:

- Answer all questions.
- Show all necessary steps to receive full mark.
- Use appropriate numerical approximations up to 4 decimal places where applicable.

Question 1 [10 marks]

(1.a) Using the **fixed-point** iterative method to approximation root of the equation $x^3 - x - 1 = 0$, and stop when $|x_{n+1} - x_n| < 10^{-4}$.

(1.b) Use **Gauss-Seidel** Iterative method to find the solution of;

$$20x + y - 2z = 17$$

$$2x - 3y + 20z = 25$$

$$3x + 20y - z = -18.$$

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Question 2 [7 marks]

(2.a) Find the missing term in the following table using **Newton divided difference** formula.

x	0	1	2	3	4
y	1	3	9		81

(2.b) Calculate Fitting exponential equation

$$y = ae^{-bx^2}$$

using **Least square** method

x	1	2	3	4	5	8
y	9.01	6.01	6.07	2.02	0.22	0.02

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Question 3 [8 marks]

(3.a) Consider the following table of data:

x	0.2	0.4	0.6	0.8	1.0
$f(x)$	0.9799	0.9178	0.8080	0.6386	0.3844

Use the best accuracy formulas to approximate $f'(0.6)$ and $f''(0.6)$.

(3.b) Evaluate

$$\int_0^1 \frac{e^x}{\sqrt{x}} dx$$

using **Simpson's rule** at $h = 0.1$.

Best Wishes
Dr. Ayman Fayez