

MATHEMATICS ASSIGNMENT FOR ALL L5 (SOD,ML,NIT)

01. Find a second-degree polynomial $P(x)$ such that $P(2) = 5$, $P'(2) = 3$ and $P''(2) = 5$ where P' and P'' are first and second derivatives of P respectively. **(4 marks)**
02. Express $f(x) = \frac{3x^3 - x^2 - 13x - 13}{x^2 - x - 6}$ in partial fractions. Then find antiderivative of $f(x)$. **(5 marks)**
03. Suppose that the profit obtained in selling x units of a certain item each week is given by $P = 50\sqrt{x} - 0.5x - 500$, $0 \leq x \leq 8000$. Find the rate of change P with respect to x when $x = 1600$. **(3 marks)**
04. Find the values of the constants a and b such that $\lim_{x \rightarrow 0} \frac{\sqrt{a+bx} - \sqrt{3}}{x} = \sqrt{3}$ **(3 marks)**
05. Using matrix inverse solve the system for real numbers x , y and z
- $$\begin{cases} x + 3y - 2z = 1 \\ y + 5z = 2 \\ -2x - 6y + 7z = 0 \end{cases}$$
- (5 marks)**
06. Evaluate integral below
- $$\int_0^{\sqrt{2}} \frac{dx}{\sqrt{4-x^2}}$$
- (3 marks)**
07. Solve in \mathbb{R} :
- a. $\sqrt{x-3} + \sqrt{x} = 3$ **(3 marks)**
- b. $\|3 - 2z\| \leq 5$ **(3 marks)**
- c. $2^x + 2^{x-1} + 2^{x-2} + 2^{x-3} = 15$ **(3 marks)**
08. Solve; $\log_2 x - \log_x 8 = 2$ **(5 marks)**
09. (a) Given that $u = (r-1) - (2-s)i$ and $z = (3i-2)^2 + 5$, find real numbers r and s such that $u = z$. **(3 marks)**
- (b) Express each of the following complex numbers in polar and exponential form. (i) $z = 1 - i\sqrt{3}$ (ii) $z = 1 + i$. **(3 marks)**

10.

- Given the numerical function $f(x) = \frac{1+\ln x}{-1+\ln x}$ find,
- (a) the domain of function $f(x)$ **(2 marks)**
- (b) the limits at the boundaries of the domain; **(2 marks)**
- (c) the asymptotes **(2 marks)**
- (d) the first and second derivatives, study their signs and draw conclusion about intervals where f is increasing, decreasing, concave up, concave down, stationary points and their nature, inflection point. **(6 marks)**
- (e) Sketch the curve representing f . **(3 marks)**

END!!!!