Sikkim Manipal Institute of Technology
Department of Mathematics
Subject: Engineering Mathematics III (MA 1307)
Problem Sheet on Lagrange's Interpoloation

---

1. Using Lagrange's interpolation formula, find the function $f(x)$ from the following table.

x	0	1	3	4
$f(x)$	-12	0	12	24

2. The population of a town during three census periods was as follows:

Year:	1951	1961	1971
Population (Million):	2.8	3.2	4.5

   Interpolate the population during 1966.

3. If $f(1) = 2$, $f(2) = 4$ and $f(4) = 16$, what is the value of $f(3)$ using Lagrange's interpolation formula? **[GATE 2004]**

4. The cubic polynomial $y(x)$ which takes the following values: $y(0) = 1$, $y(1) = 0$, $y(2) = 1$ and $y(3) = 10$ is **[ISRO 2009]**

   (a) $x^3 + 2x^2 + 1$ (c) $x^3 + 1$

   (b) $x^3 + 3x^2 - 1$ (d) $x^3 - 2x^2 + 1$

5. The follwoing values of the function $f(x) = \sin x + \cos x$, are given

x	10°	20°	30°
$f(x)$	1.1585	1.2817	1.3660

   Construct the quadratic interpolating polynomial that fits the data. Hence, find $f\left(\frac{\pi}{12}\right)$. Compare with the exact value and find the error.

   Hint: Remember that you need to convert the degree in to radians first then solve it.