Tutorial For Mathematica Workshop

Organized by

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1. (a) Create a notebook with the following specifications: The first cell is a title cell containing the title of the notebook "Mathematica Workshop @ SVNIT", the second cell is a text cell giving your name and affiliation, and the third cell is an input cell with the input
   Factor$[45 + 63x + 32x^2 + 16x^3 + 3x^4 + x^5]$
   (b) Evaluate the input in part (a)

2. Enter the Mathematica expression $\alpha + \beta$ in an input cell of a notebook. [Hint : Use Palettes]

3. Find the value of π, golden ratio and $\sqrt{3}$ upto 200 decimal places. Find which of the following is a prime number?
   (a) 123456789
   (b) 111119
   (c) 1000001

4. Evaluate
$$\left(10 * \sqrt{\frac{10.8 * 10^3}{300}}\right)^3$$

5. Find the differentiation of following with respect to x
   (a) Sin(2x)
   (b) $1 + x^2 + x^n$

(c) $e^x(x^2 + \text{Sin}(xy))$

(d) $(x^2 + y^2 + z^2)e^{xy}$

6. Evaluate the following

   (a) $\int \frac{1}{x} dx$

   (b) $\int (ax^2 + by^2 + 2xy + e^{xy}) dxdy$

   (c) $\int_{-\pi}^{\pi} e^x \ \text{Sin}(x^2) dx$

   (d) $\int_0^2 \text{Sin}(\text{Sin}(x)) dx$

7. Define a function $f(x, y) = x^n e^x + y \ \tan(x)$, and find out the value of (x, y) for which $f(x, y)$ is either maximum or minimum.

8. Solve the following equations

   (a) $ax^5 + 5x^3 + bx^2 + 10x + 1 = 0$

   (b) $x^3 - 1 = 0$

   (c) $x^3 + y^3 + 3xy = 10$ and $x^2 + 10y = 4$

9. Plot the following

   (a) $\frac{Sin(x)}{x}$

   (b) $\psi^*(x)\psi(x)$, where $\psi(x) = \frac{1}{2}e^{i2x}$

   (c) $x^2 + y^2 - 1$