# University of Ruhuna
## Department of Mathematics

Bachelor of Science (General) Degree (Level II)

Industrial Mathematics

IMT 2b2$\beta$: Mathematical Computing

**Assignment No: 10** **Semester I, 2012**

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**1.** Plot the graph of the density of the standard normal distribution, $f(x) = \frac{1}{\sqrt{2\pi}} e^{\frac{-x^2}{2}}$, in the range [3, 3]. Label the $y$ axis with **density**.

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**2.** Plot the graphs of the density of the standard normal distribution, $f(x) = \frac{1}{\sqrt{2\pi}} e^{\frac{-x^2}{2}}$, and the Cauchy distribution, $g(x) = \frac{1}{\pi(1+x^2)}$, in the range [3, 3]. Use a thick red line for the Cauchy distribution, and a thin black line for the normal distribution. The lines should be annotated with **Gaussian distribution** and **Cauchy distribution**, respectively. The vertical axis should be labeled **density**.

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**3.** Plot the graphs of the power functions $x^n$ for $n = -2,\ -1,\ 0,\ 1,\ 2$ in the range [0, 2].

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**4.** Plot the graphs of the logarithm functions $\log_2 x,\ \log_5 x,\ \ln x, \log_{10} x,\ \log_{0.5} x$ in the range [0,10]. Set the vertical range as [-2.2].

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**5.** We are given the set of data points (.25, -1.03), (.5, -0.63), (.75, -0.28), (1., 0.), (1.25, 0.22), (1.5, 0.38), (1.75, 0.47). Plot these points together with function $\log(x)$ in the range [0, 2]. Choose an appropriate range for the vertical axis.

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**6.** Draw the graph represents by the parametric equations $x = t^5 + \sin(2\pi t)$ and $y = t + e^t$ for $t$ = -1.3 to 1.3.

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**7.** Plot the graph of the binormal distribution, $f(x, y) = \frac{1}{2\pi} \exp\left(-\frac{1}{2}(x^2 + y^2)\right)$.

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**8.** Find the stationary points of the following functions and determine the nature of these points.

(a) $f(x) = \dfrac{x^2+1}{x}$

(b) $y = x^3 - 3x^2 - 9x + 3$

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