

# Assignment 1

# My First Latex Document

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Hi! This is Sahil Deshpande, and I am really excited to show my first latex document!

## Overview

LaTeX is a document preparation system for high-quality typesetting. It is most often used for medium-to-large technical or scientific documents but it can be used for almost any form of publishing.

## Text Editors

### E – TextEditor

E – TextEditor download page E – TextEditor, or just called E, is TextMate for Windows. It has a host of useful features that developers will appreciate, such as a personal revision control system to ease the burden of managing multiple versions of a file, ultimate customization possibilities, and a collection of automated tasks to save you time and improve your productivity. Check out the Keyboard Shortcuts Cheatsheet to make writing with E more efficient.

### TextPad

TextPad download page TextPad is a general purpose text editor for Windows-based systems. It has plenty of features like a spell checker for 10 languages, a Warm Start feature which lets you start the program from where you left off when you last opened it, and a keystroke macro recorder for automating keystrokes (which can save you a ton of time from typing frequently-used code), and lots more.

# Assignment 2

# COEP Technological University

## Department of Mathematics

### Test 1 Examination

MIS : 

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#### Instructions :

- All questions are compulsory.
  - Writing anything on the question paper is not allowed.
  - Mobile phone and programming calculators are strictly prohibited.
  - Exchange/Sharing of stationary, calculator etc. is not allowed.
  - Each question of Section A carries 4 marks each.
  - Each question of Section B carries 3 marks each.
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#### Section A : Calculus

1. Solve the following differential equation :

$$3x(xy - 2) dx + (x^3 + 2y) dy = 0$$

2. Solve the following differential equation using method of undetermined coefficients

$$x^3 y''' + x^2 5y'' + 2xy' + 5y = x^2 \sin x$$

3. Find the set of critical points and determine the absolute maximum and minimum values of each function on the given interval.

(a)  $f(x) = \frac{-1}{x+3}$  ,  $-2 \leq x \leq 3$

(b)  $|x|x - x$  ,  $x \in \mathbb{R}$

(c)  $f(x) = \sqrt{4 - x^2}$  ,  $-\sqrt{2} \leq x \leq 1$

(d)  $f(\theta) = \sin \theta$  ,  $\frac{-\pi}{2} \leq \theta \leq \frac{5\pi}{6}$

4. Prove the following inequality :

$$\frac{b-a}{\sqrt{1-a^2}} < \sin^{-1} b - \sin^{-1} a < \frac{b-a}{\sqrt{1-b^2}} \quad \text{for } 0 < a < 1 \text{ and } 0 < b < 1$$

5. Prove the following :

$$\beta(p, q) = \int_0^\infty \frac{y^{q-1}}{(1+y)^{p+q}} dy = \int_0^1 \frac{y^{p-1} + y^{q-1}}{(1+y)^{p+q}} dy$$

6. Solve the following expression :

$$\sum_{n=1}^{\infty} \frac{1}{1+2+\cdots+n}$$

7. Solve the following limits :

$$\lim_{n \rightarrow \infty} \left( \frac{n}{n^2+1} + \frac{n}{n^2+2} + \cdots + \frac{n}{n^2+n} \right)$$

## Section B : Linear Algebra

1. Find the rank and bases for the row and column spaces of following matrices:

$$A = \begin{pmatrix} 1 & -3 & 4 & -2 & 5 & 4 \\ 2 & -6 & 9 & -2 & 4 & 2 \\ 2 & -6 & 9 & -4 & 7 & 1 \\ -1 & 3 & -4 & -2 & 1 & 11 \end{pmatrix}$$

2. Show that the three points  $(x_1, y_1), (x_2, y_2), (x_3, y_3)$  in a plane are collinear if and only if the following matrix has rank less than 3.

$$M = \begin{bmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{bmatrix}$$

3. Determine whether B is in the column space of A, and if so, express B as a linear combination of the column vectors of A:

$$A = \begin{pmatrix} 1 & 1 & 2 \\ 1 & 0 & 1 \\ 2 & 1 & 3 \end{pmatrix}, B = \begin{pmatrix} -1 \\ 0 \\ 2 \end{pmatrix}$$

# Assignment 3

# Contents

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# 1 Images

## 1. COEP Main Building



## 2. Scenic Beauty



## 3. Graphs



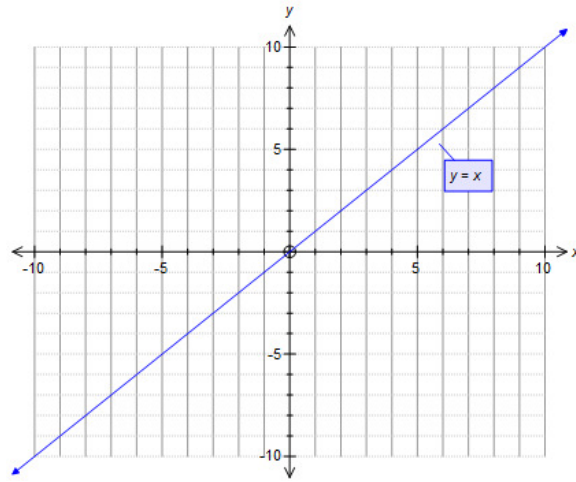


Figure 1:  $y = x$

## 2 Tables

### 2.1 Countries and its capital

The following table shows the Countries and their capitals respectively :

Country	CAPITAL
Qatar	Doha
India	Delhi
USA	Washington DC
Canada	Ottawa
Mexico	Mexico City
France	Paris
Egypt	Cairo
Scotland	Edinburgh
Netherlands	Amsterdam
Portugal	Lisbon

### 3 Csv To Latex

#### 3.1 Student Data

MIS No.	Name
112103119	Sahil
112103120	Rohan
112103121	Samarth

#### 3.2 Weather Data

Day	Temp (in F)	Humidity (percentage)
1	78.2	75
2	79.1	77
3	80.2	80.1

# Assignment 4

# Quantum Entanglement

Quantum entanglement is the phenomenon that occurs when a group of particles are generated, interact, or share spatial proximity in a way such that the quantum state of each particle of the group cannot be described independently of the state of the others, including when the particles are separated by a large distance. The topic of quantum entanglement is at the heart of the disparity between classical and quantum physics: entanglement is a primary feature of quantum mechanics not present in classical mechanics [1].

Such phenomena were the subject of a 1935 paper by Albert Einstein, Boris Podolsky, and Nathan Rosen, [2] and several papers by Erwin Schrödinger shortly thereafter, [3, 4] describing what came to be known as the EPR paradox. Einstein and others considered such behavior impossible, as it violated the local realism view of causality (Einstein referring to it as "spooky action at a distance") [5] and argued that the accepted formulation of quantum mechanics must therefore be incomplete.

Later, however, the counterintuitive predictions of quantum mechanics were verified [6, 7, 8] in tests where polarization or spin of entangled particles was measured at separate locations, statistically violating Bell's inequality. In earlier tests, it could not be ruled out that the result at one point could have been subtly transmitted to the remote point, affecting the outcome at the second location. [8] However, so-called "loophole-free" Bell tests have been performed where the locations were sufficiently separated that communications at the speed of light would have taken longer—in one case, 10,000 times longer—than the interval between the measurements.[7, 6]

## References

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