

CS 213: System Software Lab
Autumn 2023, IIT Dharwad
Lab-4 Exercise
Latex

1. Create a document with the title Hello World!, your name, and today's date. Include in the document the following text "*Hello World! Today I am learning LaTeX.*" The solution should look like this (but with today's date).

Hello World!

Your Name

August 30, 2023

Hello World! Today I am learning L^AT_EX.

2. Now for the previous document Create two lists, one with the `itemize` environment, and one with the `enumerate` environment. Both use the command `\item` to indicate a new entry in the list.

Hello World!

Your Name

August 30, 2023

Hello World! Today I am learning L^AT_EX.

- First item
- Second item
- Third item

1. First item
2. Second item
3. Third item

3. Using the \section commands, try to put your first list in Section 1, and the second list in Section 2. Give your sections names.

Hello World!

Your Name

August 30, 2023

Hello World! Today I am learning L^AT_EX.

1 Itemize List

- First item
- Second item
- Third item

2 Enumerate List

1. First item
2. Second item
3. Third item

4. For the same exercise Put some `\subitem` in each list.

Hello World!

Your Name

August 30, 2023

Hello World! Today I am learning L^AT_EX.

1 Itemize List

- First item
- Second item
 - Subitem 1
 - Subitem 2
- Third item

2 Enumerate List

1. First item
2. Second item
 - (a) Subitem 1
 - (b) Subitem 2
3. Third item

5. Create a document with a small table, using the `table` environment.

Header 1	Header 2
Row 1, Cell 1	Row 1, Cell 2
Row 2, Cell 1	Row 2, Cell 2

Table 1: A Simple Table

6. Experiment with math mode. Type the simple equation $x = y$ in both `inline` or `text` mode, and also from within the equation environment.

In inline math mode: $x = y$.
Equation environment:

$$x = y$$

(1)

7. Add to the document you created in exercise 1 the following text:

"LaTeX is a great program for writing math. I can write in line math such as $a^2 + b^2 = c^2$. I can also give equations their own space: $\gamma^2 + \theta^2 = \omega^2$ "

Your final document should look like this:

Hello World!

Your Name

August 30, 2023

Hello World! Today I am learning L^AT_EX. L^AT_EX is a great program for writing math. I can write in line math such as $a^2 + b^2 = c^2$. I can also give equations their own space:

$$\gamma^2 + \theta^2 = \omega^2$$

8. In this exercise you will build onto the document created in exercises 1 and 7 with more complicated math and structures. First give the display environment equation from exercise 7 an equation number. Second add the following line of text (make sure there it is not indented as a new paragraph). "*Maxwell's equations*" are named for James Clark Maxwell and are as follow: Now write Maxwell's equations (as seen below), use an align environment and align the equations at the = signs and at the equations names.

Hello World!

Your Name

August 30, 2023

Hello World! Today I am learning L^AT_EX. L^AT_EX is a great program for writing math. I can write in line math such as $a^2 + b^2 = c^2$. I can also give equations their own space:

$$\gamma^2 + \theta^2 = \omega^2 \tag{1}$$

"Maxwell's equations" are named for James Clark Maxwell and are as follow:

$$\vec{\nabla} \cdot \vec{E} = \frac{\rho}{\epsilon_0} \quad \text{Gauss's Law} \tag{2}$$

$$\vec{\nabla} \cdot \vec{B} = 0 \quad \text{Gauss's Law for Magnetism} \tag{3}$$

$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \quad \text{Faraday's Law of Induction} \tag{4}$$

$$\vec{\nabla} \times \vec{B} = \mu_0 \left(\epsilon_0 \frac{\partial \vec{E}}{\partial t} + \vec{J} \right) \quad \text{Ampere's Circuital Law} \tag{5}$$

9. In this exercise add the matrix equation to your previous document (exercise-8) as seen below.

Hello World!

Your Name

August 30, 2023

1 Getting Started

Hello World! Today I am learning L^AT_EX. L^AT_EX is a great program for writing math. I can write in line math such as $a^2 + b^2 = c^2$. I can also give equations their own space:

$$\gamma^2 + \theta^2 = \omega^2 \quad (1)$$

“Maxwell’s equations” are named for James Clark Maxwell and are as follow:

$$\vec{\nabla} \cdot \vec{E} = \frac{\rho}{\epsilon_0} \quad \text{Gauss's Law} \quad (2)$$

$$\vec{\nabla} \cdot \vec{B} = 0 \quad \text{Gauss's Law for Magnetism} \quad (3)$$

$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \quad \text{Faraday's Law of Induction} \quad (4)$$

$$\vec{\nabla} \times \vec{B} = \mu_0 \left(\epsilon_0 \frac{\partial \vec{E}}{\partial t} + \vec{J} \right) \quad \text{Ampere's Circuital Law} \quad (5)$$

Equations 2, 3, 4, and 5 are some of the most important in Physics.

2 What about Matrix Equations?

$$\begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{pmatrix} \begin{bmatrix} v_1 \\ v_2 \\ \vdots \\ v_n \end{bmatrix} = \begin{bmatrix} w_1 \\ w_2 \\ \vdots \\ w_n \end{bmatrix}$$

10. For this exercise create a new section to your document for figures and tables. In that section create a table and a figure. Give each object a caption, try putting the table caption above the table and the figure caption below. Try this with a figure of your choice.

Table 1: This is a table that shows how to create different lines as well as different justifications

x	1	2	3
$f(x)$	4	8	12
f(x)	4	8	12



Figure 1: Bern Dibner Library

11. Create a BibTex file with a few citations in it. Add a sentence that contains these citations and then add a bibliography to your document.

References

- [1] M. Frenkel, M. Avellan, and Z. Guo, "Fine temperature measurement and fabrication of on-chip whispering-gallery mode micro-sensors," in *ASME 2013 4th International Conference on Micro/Nanoscale Heat and Mass Transfer, MNHMT 2013*, American Society of Mechanical Engineers (ASME), 2013. Conference Proceedings.
- [2] M. Frenkel, M. Avellan, and Z. Guo, "Optical whispering-gallery mode phenomenon as a composite sensor with applications to direct on-chip thermal sensing," in *ASME 2013 Heat Transfer Summer Conf. Collocated with the ASME 2013 7th Int. Conf. on Energy Sustainability and the ASME 2013 11th Int. Conf. on Fuel Cell Science, Engineering and Technology, HT 2013*, vol. 4, 2013. Conference Proceedings.
- [3] M. Frenkel, M. Avellan, and Z. Guo, "Temperature sensing of joule heating inside an optical whispering-gallery mode micro-annulus," in *ASME*

2012 Heat Transfer Summer Conf. Collocated with the ASME 2012 Fluids Engineering Div. Summer Meeting and the ASME 2012 10th Int. Conf. on Nanochannels, Microchannels and Minichannels, HT 2012, vol. 2, pp. 823–826, 2012. Conference Proceedings.

- [4] M. Frenkel, M. Avellan, and Z. X. Guo, "Whispering-gallery mode composite sensors for on-chip dynamic temperature monitoring," *MEASUREMENT SCIENCE AND TECHNOLOGY*, vol. 24, no. 7, 2013.
- [5] M. Frenkel and Z. Guo, "On-chip, dynamic, and cryogenic temperature monitoring via PDMS micro-bead coatings," *Journal of Polymer Science Part B: Polymer Physics*, vol. 54, no. 12, pp. 1118–1124, 2016.