

S.E.C

DOCUMENT PREPARATION AND PRESENTATION SOFTWARE.

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B.Sc(P)PHY.SC.

15640

SYLLABUS EX-1

INPUT

```
1 \documentclass{article}
2
3 \title{Hello World!}
4 \author{Prof. Naveen Kumar}
5 \date{November 15, 2022}
6
7 \begin{document}
8
9 \maketitle
10
11 \textbf{Hello World!} Today I am learning \LaTeX. \LaTeX is a great
    program for writing math. I can write inline math such as  $a^2 + b^2 = c^2$ . I can also give equations their own space: 
$$\gamma^2 + \theta^2 = \omega^2$$

12
13 \end{document}
```

OUTPUT

Hello World!

Prof. Naveen Kumar

November 15, 2022

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

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

SYLLABUS EX-2

OUTPUT

INPUT

```
1 \documentclass{article}
2 \usepackage{amsfonts, amsmath, amssymb}
3 \usepackage{esint}
4 \title{Integrals, Sums and Limits}
5 \author{Dr. Neeraj Kumar Sharma}
6 \date{}
7
8 \begin{document}
9 \maketitle
10
11 \section{Integrals}
12 Integral  $\int_a^b x^2 dx$  inside text.
13
14 \vspace{0.2cm}
15 The same integral on display: 
$$\int_a^b x^2 dx$$

16 and multiple integrals:
17 \begin{gather*}
18 \iint_V \mu(u,v) du dv \\
19 \iiint_V \mu(u,v,w) du dv dw \\
20 \oint_V f(s) ds
21 \end{gather*}
22 \section{Sums and Products}
23 Sum  $\sum_{n=1}^{\infty} 2^{-n} = 1$  inside text.
24
25 The same sum on display: 
$$\sum_{n=1}^{\infty} 2^{-n} = 1$$

26
27 Product  $\prod_{i=a}^b f(i)$  inside text.
28
29 The same product on display: 
$$\prod_{i=a}^b f(i)$$

30 \section{Limits}
31 Limit  $\lim_{x \rightarrow \infty} f(x)$  inside text.
32
33 The same limit on display: 
$$\lim_{x \rightarrow \infty} f(x)$$

34 \end{document}
```

Integrals, Sums and Limits

Dr. Neeraj Kumar Sharma

1 Integrals

Integral $\int_a^b x^2 dx$ inside text.

The same integral on display:

$$\int_a^b x^2 dx$$

and multiple integrals:

$$\begin{aligned} &\iint_V \mu(u,v) du dv \\ &\iiint_V \mu(u,v,w) du dv dw \\ &\oint_V f(s) ds \end{aligned}$$

2 Sums and Products

Sum $\sum_{n=1}^{\infty} 2^{-n} = 1$ inside text.

The same sum on display:

$$\sum_{n=1}^{\infty} 2^{-n} = 1$$

Product $\prod_{i=a}^b f(i)$ inside text.

The same product on display:

$$\prod_{i=a}^b f(i)$$

3 Limits

Limit $\lim_{x \rightarrow \infty} f(x)$ inside text.

The same limit on display:

$$\lim_{x \rightarrow \infty} f(x)$$

INPUT

SYLLABUS EX-3

```

1 \documentclass{article}
2
3 \usepackage{authblk}
4 \usepackage{amsmath, amsmath, amssymb}
5 \usepackage{xcolor}
6
7 \title{Equations}
8 \author[1]{Prof. Naveen Kumar}
9 \author[2]{Dr. Neeraj Kumar Sharma}
10 \author[3]{Sakeena Shahid}
11 \affil[1]{Department of Computer Science, University of Delhi}
12 \affil[2]{Ram Lal Anand College, University of Delhi}
13 \affil[3]{SGTB Khalsa College, University of Delhi}
14 \date{November 15, 2022}
15
16 \begin{document}
17
18 \maketitle
19
20 \section{Maxwell's Equations}
21 "Maxwell's equations" are named for James Clark Maxwell and are as follow:\\
22 \begin{align}
23 \quad \text{\textcolor{violet}{\(\vec{\nabla} \cdot \vec{E} \quad \&= \quad \frac{\rho}{\epsilon_0} \quad \&\& \text{\textcolor{blue}{Gauss's Law}}\)}\\
24 \quad \text{\textcolor{violet}{\(\vec{\nabla} \cdot \vec{B} \quad \&= \quad 0 \quad \&\& \text{\textcolor{blue}{Gauss's Law for Magnetism}}\)}\\
25 \quad \text{\textcolor{violet}{\(\vec{\nabla} \times \vec{E} \quad \&= \quad - \frac{\partial \vec{B}}{\partial t} \quad \&\& \text{\textcolor{blue}{Faraday's Law of Induction}}\)}\\
26 \quad \text{\textcolor{violet}{\(\vec{\nabla} \times \vec{B} \quad \&= \quad \mu_0 \left( \epsilon_0 \frac{\partial \vec{E}}{\partial t} + \vec{J} \right) \quad \&\& \text{\textcolor{blue}{Ampere's Circuital Law}}\)}\\
27 \end{align}
28 Equations \textcolor{blue}{1, 2, 3,} and \textcolor{blue}{4} are some of the most important
in physics.

```

```

30 \section{Matrix Equations}
31 \[
32 \begin{pmatrix}
33     a_{11} & a_{12} & \hdots & a_{1n} \\
34     a_{21} & a_{22} & \hdots & a_{2n} \\
35     \vdots & \vdots & \ddots & \vdots \\
36     a_{n1} & a_{n2} & \hdots & a_{nn}
37 \end{pmatrix}
38 \begin{bmatrix}
39     v_1 \\
40     v_2 \\
41     \vdots \\
42     v_n
43 \end{bmatrix} =
44 \begin{matrix}
45     w_1 \\
46     w_2 \\
47     \vdots \\
48     w_n
49 \end{matrix}
50 \]
51
52 \end{document}

```

Equations

Prof. Naveen Kumar¹, Dr. Neeraj Kumar Sharma², and Sakeena Shahid³

¹Department of Computer Science, University of Delhi

²Ram Lal Anand College, University of Delhi

³SGTB Khalsa College, University of Delhi

November 15, 2022

1 Maxwell's Equations

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

$$\vec{\nabla} \cdot \vec{E} = \frac{\rho}{\epsilon_0} \quad \text{Gauss's Law} \quad (1)$$

$$\vec{\nabla} \cdot \vec{B} = 0 \quad \text{Gauss's Law for Magnetism} \quad (2)$$

$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \quad \text{Faraday's Law of Induction} \quad (3)$$

$$\vec{\nabla} \times \vec{B} = \mu_0 \left(\epsilon_0 \frac{\partial \vec{E}}{\partial t} + \vec{J} \right) \quad \text{Ampere's Circuital Law} \quad (4)$$

Equations 1, 2, 3, and 4 are some of the most important in physics.

2 Matrix Equations

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

INPUT

SYLLABUS EX-4

OUTPUT

```
1 \documentclass{article}
2
3 \begin{document}
4
5 List of mathematical functions:
6 \begin{itemize}
7 \item Trigonometric functions
8 \begin{itemize}
9 \item sine
10 \item cosine
11 \item tangent
12 \end{itemize}
13 \item Special functions
14 \begin{itemize}
15 \item Beta function
16 \item Gamma function
17 \item Reimann zeta function
18 \end{itemize}
19 \end{itemize}
20
21 \end{document}
```

List of mathematical functions:

- Trigonometric functions
 - sine
 - cosine
 - tangent
- Special functions
 - Beta function
 - Gamma function
 - Reimann zeta function

SYLLABUS EX-5

INPUT

OUTPUT

```
1 \documentclass{article}
2 \usepackage{xcolor}
3 \usepackage[linesnumbered, ruled, vlined]{algorithm2e}
4 \newcommand\mycommfont[1]{\footnotesize\ttfamily\textcolor{blue}{#1}}
5 \SetCommentSty{mycommfont}
6 \SetKwInput{KwInput}{Input}
7 \SetKwOutput{KwOutput}{Output}
8 \begin{document}
9
10 \begin{algorithm}[!h]
11   \caption{Example code}
12
13   \KwInput{Your Input}
14   \KwOutput{Your Output}
15   \KwData{Testing set  $x$ }
16
17    $\sum_{i=1}^{\infty} := 0$  \tcp*{this is a comment}
18   \tcc{Now this is an if...else conditional loop}
19   \If{Condition 1}{
20     Do something \tcp*{this is another comment}
21     \If{sub-Condition}{
22       Do a lot
23     }
24   }
25   \ElseIf{Condition 2}{
26     Do Otherwise\
27     \tcc{Now this is a for loop}
28     \For{sequence}{
29       loop instructions
30     }
31   }
32   \Else{
33     Do the rest
34   }
35   \tcc{Now this is a While loop}
36   \While{Condition}{
37     Do something
38   }
39 \end{algorithm}
40
41 \end{document}
```

Algorithm 1: Example code

```
Input: Your Input
Output: Your Output
Data: Testing set  $x$ 
1  $\sum_{i=1}^{\infty} := 0$  ; // this is a comment
  /* Now this is an if...else conditional loop */
2 if Condition 1 then
3   | Do something ; // this is another comment
4   | if sub-Condition then
5   | | Do a lot
6 else if Condition 2 then
7   | Do Otherwise
8   | /* Now this is a for loop */
9   | for sequence do
10  | | loop instructions
11 else
12   | Do the rest
13   | /* Now this is a While loop */
14 while Condition do
15   | Do something
```

SYLLABUS EX-6

INPUT

```
1 \documentclass{article}
2
3 \usepackage{multicol, multirow}
4
5 \begin{document}
6
7 \begin{tabular}{|c|c|c|}
8     \hline
9     col1 & col2 & col3\\
10    \hline
11    \multirow{3}{0.55in}{Multiple row} & cell2 & cell3\\
12    & cell5 & cell6\\
13    & cell8 & cell9\\
14    \hline
15 \end{tabular}
16
17 \end{document}
```

OUTPUT

| col1 | col2 | col3 |
|-----------------|-------|-------|
| Multiple row | cell2 | cell3 |
| | cell5 | cell6 |
| | cell8 | cell9 |

INPUT

```
1 \documentclass{article}
2
3 \usepackage{multicol, multirow}
4
5 \setlength{\arrayrulewidth}{0.5mm}
6 \setlength{\tabcolsep}{18pt}
7 \renewcommand{\arraystretch}{1.5}
8
9 \begin{document}
10
11 \begin{tabular}{|p{3cm}|p{3cm}|p{3cm}|}
12 \hline
13 \multicolumn{3}{|c|}{Country List}\\
14 \hline
15 Country Name or Area Name & ISO ALPHA 2 Code & ISO ALPHA 3\\
16 \hline
17 Afghanistan & AF & AFG\\
18 Åland Islands & AX & ALA\\
19 Albania & AL & ALB\\
20 Algeria & DZ & DZA\\
21 American Samoa & AS & ASM\\
22 Andorra & AD & AND\\
23 Angola & AO & AGO\\
24 \hline
25 \end{tabular}
26
27 \end{document}
```

SYLLABUS EX-7

OUTPUT

| Country List | | |
|---------------------------|------------------|-------------|
| Country Name or Area Name | ISO ALPHA 2 Code | ISO ALPHA 3 |
| Afghanistan | AF | AFG |
| Åland Islands | AX | ALA |
| Albania | AL | ALB |
| Algeria | DZ | DZA |
| American Samoa | AS | ASM |
| Andorra | AD | AND |
| Angola | AO | AGO |

INPUT

SYLLABUS EX-8

OUTPUT

```
1 \documentclass{article}
2 \usepackage{graphicx}
3 \usepackage{subcaption}
4 \begin{document}
5
6 \begin{figure}[ht]
7   \centering
8
9   \begin{subfigure}{0.4\textwidth}
10    \includegraphics[width=\linewidth]{aesthetics-in-photography-6.jpg}
11    \caption{Subfigure 1 caption}
12    \label{subfig:1}
13  \end{subfigure}
14  \begin{subfigure}{0.4\textwidth}
15    \includegraphics[width=\linewidth]{aesthetics-in-photography-6.jpg}
16    \caption{Subfigure 2 caption}
17    \label{subfig:2}
18  \end{subfigure}
19  \begin{subfigure}{0.4\textwidth}
20    \includegraphics[width=\linewidth]{aesthetics-in-photography-6.jpg}
21    \caption{Subfigure 3 caption}
22    \label{subfig:3}
23  \end{subfigure}
24  \begin{subfigure}{0.4\textwidth}
25    \includegraphics[width=\linewidth]{aesthetics-in-photography-6.jpg}
26    \caption{Subfigure 4 caption}
27    \label{subfig:4}
28  \end{subfigure}
29  \caption{This is a figure containing several subfigures.}
30  \label{fig:subfigs}
31 \end{figure}
32 In the text you can refer to subfigures of figures 1 as 1a, 1b, 1c and 1d and to the sub-index as (a), (b), (c) and (d).
```



(a) Subfigure 1 caption

(b) Subfigure 2 caption



(c) Subfigure 3 caption

(d) Subfigure 4 caption

Figure 1: This is a figure containing several subfigures.

In the text you can refer to subfigures of figures 1 as 1a, 1b, 1c and 1d and to the sub-index as (a), (b), (c) and (d).

INPUT

```
1 \documentclass{article}
2 \usepackage{graphicx}
3 \begin{document}
4 \tableofcontents
5 \listoftables
6 \listoffigures
7 \addcontentsline{toc}{section}{Table of Contents}
8 \newpage
9 \section{First Section}
10
11 \begin{table}[!h]
12     \centering
13     \begin{tabular}{|c|c|}
14         \hline
15         1 & 2 \\ \hline
16         1 & 2 \\
17     \hline
18     \end{tabular}
19     \caption{Just a table}
20     \label{tab:my_label}
21 \end{table}
22
23 \section{Second Section}
24
25 \begin{figure}[!h]
26     \centering
27     \includegraphics[width = 0.4\textwidth]{aesthetics-in-photography-6.jpg}
28     \caption{This is an image}
29     \label{fig:enter-label}
30 \end{figure}
31 \end{document}
```

SYLLABUS EX-9

OUTPUT

Contents

| | |
|-------------------|---|
| Table of Contents | 1 |
| 1 First Section | 2 |
| 2 Second Section | 2 |

List of Tables

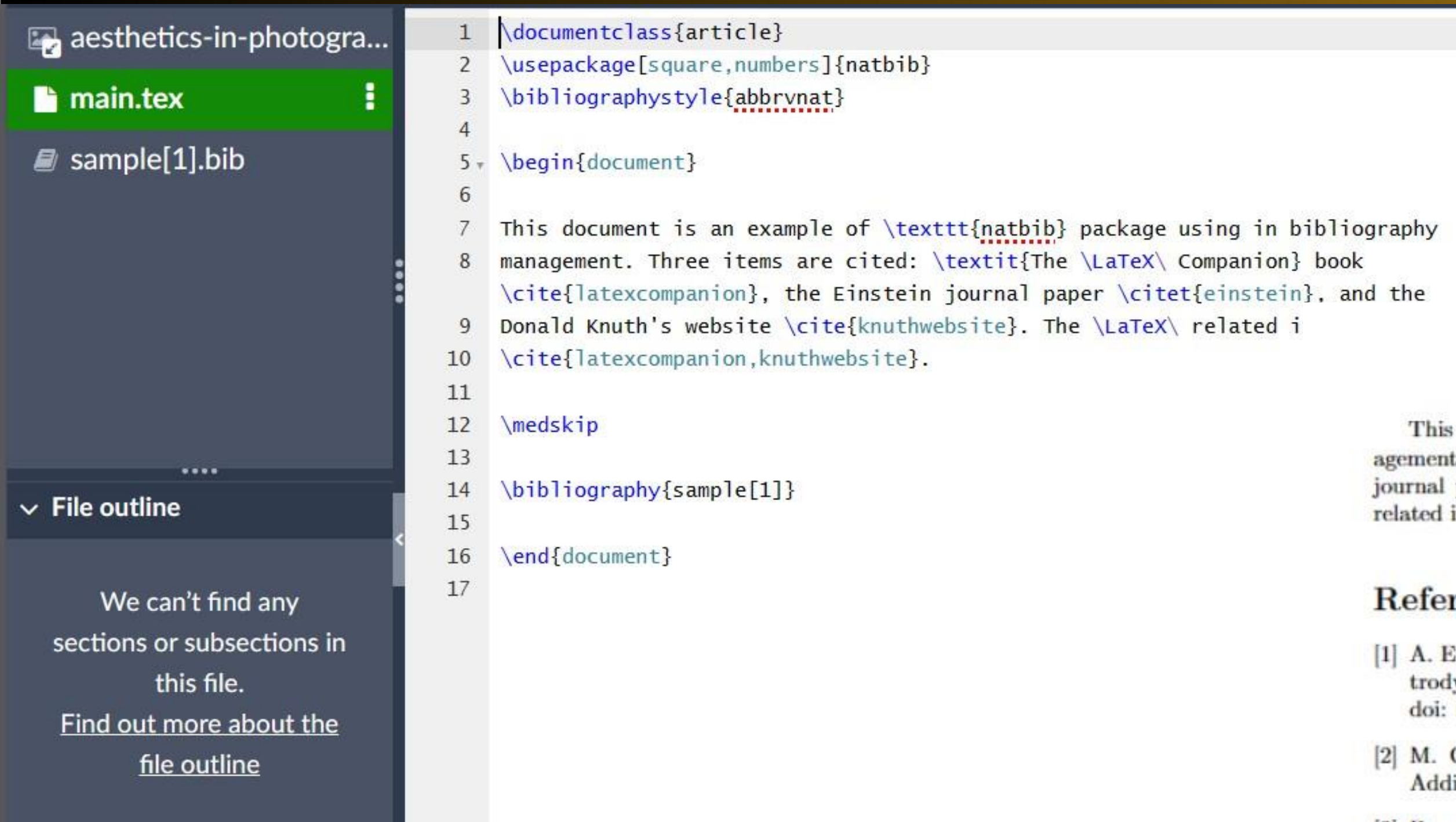
| | |
|--------------------------|---|
| 1 Just a table | 2 |
|--------------------------|---|

List of Figures

| | |
|------------------------------|---|
| 1 This is an image | 2 |
|------------------------------|---|

SYLLABUS EX-10

INPUT



This document is an example of `natbib` package using in bibliography management. Three items are cited: *The L^AT_EX Companion* book [2], the Einstein journal paper Einstein [1], and the Donald Knuth's website [3]. The L^AT_EX related items are [2, 3].

References

- [1] A. Einstein. Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]. *Annalen der Physik*, 322(10):891–921, 1905. doi: <http://dx.doi.org/10.1002/andp.19053221004>.
- [2] M. Goossens, F. Mittelbach, and A. Samarin. *The L^AT_EX Companion*. Addison-Wesley, Reading, Massachusetts, 1993.
- [3] D. Knuth. Knuth: Computers and typesetting. URL <http://www-cs-faculty.stanford.edu/~uno/abcde.html>.

INPUT

CH-9 1ST

```
1 \documentclass{article}
2 \usepackage{amsmath}
3 \begin{document}
4 If  $m=1$  and  $n=2$ , then  $m+n=3$ .
5 %In LaTeX, variables like 'm' and 'n' should be in math mode to display
   properly.
6
7 If  $m=1$  and  $n=2$ , then  $m+n=3$ .
8
9 \end{document}
```

OUTPUT

If $m=1$ and $n=2$, then $m+n=3$.
If $m = 1$ and $n = 2$, then $m + n = 3$.

INPUT

CH-9 2ND

```
1 \documentclass{article}
2 \usepackage{amsmath}
3 \begin{document}
4 If  $\theta = \pi$ , then  $\sin \theta = 0$ .
5 %Greek letters and trigonometric functions should be preceded by a backslash
  for proper rendering.
6
7 If  $\theta = \pi$ , then  $\sin \theta = 0$ .
8 \end{document}
```

OUTPUT

If $\theta = \pi$, then $\sin \theta = 0$.
If $\theta = \pi$, then $\sin \theta = 0$.

INPUT

CH-9 3RD

```
1 \documentclass{article}
2 \begin{document}
3 If  $x=3$ , then  $3x=9$ .\\
4 %We can use 'Display Math' mode instead of 'Inline Math' mode to make it
   more visually appealing. Like this:
5 If  $x=3$ , then  $3x=9$ .
6 \end{document}
```

OUTPUT

If $x = 3$, then $3x = 9$.

If

$$x = 3,$$

then

$$3x = 9.$$

CH-9 4TH

INPUT

```

1 \documentclass{article}
2 \usepackage{amsmath}
3 \begin{document}
4
5 \begin{align*}
6 3 + 4^3 + 5^3 &= 63 \\
7 \sqrt{100} &= 10 \\
8 (a + b)^3 &= a^3 + 3a^2b + 3ab^2 + b^3 \\
9 \sum_{k=1}^n k &= \frac{n(n+1)}{2} \\
10 \frac{\pi}{4} &= 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots \\
11 \cos \theta &= \sin(90^\circ - \theta) \\
12 e^{i\theta} &= \cos \theta + i \sin \theta \\
13 \lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} &= 1 \\
14 \lim_{x \rightarrow \infty} \frac{\pi(x)}{x/\log x} &= 1 \\
15 \int_{-\infty}^{\infty} e^{-x^2} dx &= \sqrt{\pi} \\
16 \end{align*}
17 \end{document}

```

OUTPUT

$$3 + 4^3 + 5^3 = 63$$

$$\sqrt{100} = 10$$

$$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$\sum_{k=1}^n k = \frac{n(n+1)}{2}$$

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots$$

$$\cos \theta = \sin(90^\circ - \theta)$$

$$e^{i\theta} = \cos \theta + i \sin \theta$$

$$\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$$

$$\lim_{x \rightarrow \infty} \frac{\pi(x)}{x/\log x} = 1$$

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

OUTPUT

Positive numbers a , b , and c are the side lengths of a triangle if and only if $a + b > c$, $b + c > a$, and $c + a > b$.

The area of a triangle with side lengths a , b , c is given by Heron's formula:

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

where s is semiperimeter $(a + b + c)/2$.

The volume of a regular tetrahedron of edge length 1 is $\sqrt{2}/12$.

The quadratic equation $ax^2 + bx + c = 0$ has roots

$$r_1, r_2 = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

The *derivative* of a function f , denoted f' , is defined by

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}.$$

A real-valued function f is *convex* on an interval I if

$$f(\lambda x + (1 - \lambda)y) \leq \lambda f(x) + (1 - \lambda)f(y),$$

for all $x, y \in I$ and $0 \leq \lambda \leq 1$.

The general solution to the differential equation

$$y'' - 3y' + 2y = 0$$

is

$$y = C_1 e^x + C_2 e^{2x}.$$

The Fermat number F_n is defined as

$$F_n = 2^{2^n}, n \geq 0.$$

CH-9 5TH

INPUT

```
1 \documentclass{article}
2 \usepackage{amsmath}
3 \begin{document}
4 Positive numbers  $a$ ,  $b$ , and  $c$  are the side lengths of a triangle if and
   only if  $a + b > c$ ,  $b + c > a$ , and  $c + a > b$ .\\
5 The area of a triangle with side lengths  $a$ ,  $b$ ,  $c$  is given by Heron's
   formula:
6 \[ A = \sqrt{s(s-a)(s-b)(s-c)} \] \\
7 where  $s$  is semiperimeter  $(a + b + c)/2$ . \\
8 The volume of a regular tetrahedron of edge length 1 is  $\sqrt{2}/12$ .\\
9 The quadratic equation  $ax^2 + bx + c = 0$  has roots  $[r_1, r_2 = \frac{-b}{\pm \sqrt{b^2 - 4ac}}]{2a}$ .\\
10 The derivative of a function  $f$ , denoted  $f'$ , is defined by  $[f'(x) =$ 
     $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}. ]$ 
11 A real-valued function  $f$  is convex on an interval  $I$  if  $[f(\lambda x +$ 
     $(1 - \lambda)y) \leq \lambda f(x) + (1 - \lambda)f(y), ]$  for all  $x, y \in$ 
     $I$  and  $0 \leq \lambda \leq 1$ .\\
12 The general solution to the differential equation
13  $[y'' - 3y' + 2y = 0 ]$  is  $[y = C_1 e^x + C_2 e^{2x}.]$ 
14 The Fermat number  $F_n$  is defined as  $[F_n = 2^{2^n}, n \geq 0.]$ 
15 \end{document}
```


INPUT

```

1 \documentclass{article}
2 \usepackage{amsmath}
3 \begin{document}
4 \[\frac{d}{dx} \left( \frac{x}{x+1} \right) = \frac{1}{(x+1)^2}\]
5 \[\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = e\]
6 \[
7 \begin{vmatrix}
8 a & b \\
9 c & d \end{vmatrix}
10 \end{vmatrix} = ad - bc \]
11 \[
12 R_{\theta} = \begin{bmatrix}
13 \cos \theta & -\sin \theta \\
14 \sin \theta & \cos \theta \end{bmatrix}
15 \end{bmatrix}
16 \[
17 \begin{vmatrix}
18 i & j & k \\
19 a_1 & a_2 & a_3 \\
20 b_1 & b_2 & b_3 \end{vmatrix} = \begin{vmatrix}
21 a_2 & a_3 \\
22 b_2 & b_3 \end{vmatrix}
23 \end{vmatrix} \textbf{i} -
24 \begin{vmatrix}
25 a_1 & a_3 \\
26 b_1 & b_3 \end{vmatrix}
27 \end{vmatrix} \textbf{j} +
28 \begin{vmatrix}
29 a_1 & a_2 \\
30 b_1 & b_2 \end{vmatrix}
31 \end{vmatrix} \textbf{k}
32 \]
33 \]
```

```

34 \[
35 \begin{bmatrix}
36 a_{11} & a_{12} \\
37 a_{21} & a_{22} \end{bmatrix}
38 \end{bmatrix}
39 \begin{bmatrix}
40 b_{11} & b_{12} \\
41 b_{21} & b_{22} \end{bmatrix}
42 \end{bmatrix} = \begin{bmatrix}
43 a_{11}b_{11} + a_{12}b_{21} & a_{11}b_{12} + a_{12}b_{22} \\
44 a_{21}b_{11} + a_{22}b_{21} & a_{21}b_{12} + a_{22}b_{22} \end{bmatrix}
45 \end{bmatrix}
46 \[
47 f(x) = \begin{cases}
48 -x^2, & x < 0 \\
49 x^2, & 0 \leq x \leq 2 \\
50 4, & x > 2 \end{cases}
51 \end{cases}
52 \end{document}
```

CH-9 6TH

OUTPUT

$$\frac{d}{dx} \left(\frac{x}{x+1} \right) = \frac{1}{(x+1)^2}$$

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

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

$$R_{\theta} = \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$$

$$\begin{vmatrix} i & j & k \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix} = \begin{vmatrix} a_2 & a_3 \\ b_2 & b_3 \end{vmatrix} \mathbf{i} - \begin{vmatrix} a_1 & a_3 \\ b_1 & b_3 \end{vmatrix} \mathbf{j} + \begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix} \mathbf{k}$$

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} = \begin{bmatrix} a_{11}b_{11} + a_{12}b_{21} & a_{11}b_{12} + a_{12}b_{22} \\ a_{21}b_{11} + a_{22}b_{21} & a_{21}b_{12} + a_{22}b_{22} \end{bmatrix}$$

$$f(x) = \begin{cases} -x^2, & x < 0 \\ x^2, & 0 \leq x \leq 2 \\ 4, & x > 2 \end{cases}$$

OUTPUT

CH-9 7TH

INPUT

$$\begin{aligned} 1 + 2 &= 3 \\ 4 + 5 + 6 &= 7 + 8 \\ 9 + 10 + 11 + 12 &= 13 + 14 + 15 \\ 16 + 17 + 18 + 19 + 20 &= 21 + 22 + 23 + 24 \\ 25 + 26 + 27 + 28 + 29 + 30 &= 31 + 32 + 33 + 34 + 35 \end{aligned}$$

$$\begin{aligned} (a + b)^2 &= (a + b)(a + b) \\ &= (a + b)a + (a + b)b \\ &= a(a + b) + b(a + b) \\ &= a^2 + ab + ba + b^2 \\ &= a^2 + ab + ab + b^2 \\ &= a^2 + 2ab + b^2 \end{aligned}$$

$$\begin{aligned} \tan(\alpha + \beta + \gamma) &= \frac{\tan(\alpha + \beta) + \tan \gamma}{1 - \tan(\alpha + \beta) \tan \gamma} \\ &= \frac{\frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta} + \tan \gamma}{1 - \left(\frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta} \right) \tan \gamma} \\ &= \frac{\tan \alpha + \tan \beta + (1 - \tan \alpha \tan \beta) \tan \gamma}{1 - \tan \alpha \tan \beta (\tan \alpha + \tan \beta) \tan \gamma} \\ &= \frac{\tan \alpha + \tan \beta + \tan \gamma - \tan \alpha \tan \beta \tan \gamma}{1 - \tan \alpha \tan \beta - \tan \alpha \tan \gamma - \tan \beta \tan \gamma} \end{aligned}$$

$$\begin{aligned} \prod_p \left(1 - \frac{1}{p^2} \right) &= \prod_p \frac{1}{1 + \frac{1}{p^2} + \frac{1}{p^4} + \cdots} \\ &= \left(\prod_p \left(1 + \frac{1}{p^2} + \frac{1}{p^4} + \cdots \right) \right)^{-1} \\ &= \left(1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots \right)^{-1} \\ &= \frac{6}{\pi^2} \end{aligned}$$

```

1 \documentclass{article}
2 \usepackage{amsmath}
3 \begin{document}
4 \begin{eqnarray*}
5 1+2 &=& 3 \\
6 4+5+6 &=& 7+8\\
7 9+10+11+12 &=& 13+14+15\\
8 16+17+18+19+20 &=& 21+22+23+24\\
9 25+26+27+28+29+30 &=& 31+32+33+34+35
10 \end{eqnarray*}
11 \begin{eqnarray*}
12 (a + b)^2 &=& (a + b)(a + b) \\
13 &=& (a + b)a + (a + b)b \\
14 &=& a(a + b) + b(a + b) \\
15 &=& a^2 + ab + ba + b^2 \\
16 &=& a^2 + ab + ab + b^2 \\
17 &=& a^2 + 2ab + b^2 \\
18 \end{eqnarray*}
19 \begin{eqnarray*}
20 \tan ( \alpha + \beta + \gamma) &=& \frac{\tan(\alpha+\beta)+\tan \gamma}{1-\tan(\alpha+\beta)\tan\gamma} \\
21 &=& \frac{\frac{\tan \alpha+\tan \beta}{1-\tan \alpha \tan \beta} + \tan \gamma}{1-\left( \frac{\tan \alpha+\tan \beta}{1-\tan \alpha \tan \beta} \right) \tan \gamma} \\
22 &=& \frac{\tan \alpha + \tan \beta + (1-\tan \alpha \tan \beta) \tan \gamma}{1-\tan \alpha \tan \beta (\tan \alpha + \tan \beta) \tan \gamma} \\
23 &=& \frac{\tan \alpha + \tan \beta + \tan \gamma - \tan \alpha \tan \beta \tan \gamma}{1-\tan \alpha \tan \beta - \tan \alpha \tan \gamma - \tan \beta \tan \gamma} \\
24 \end{eqnarray*}
25 \begin{eqnarray*}
26 \prod_{p}\left(1- \frac{1}{p^2} \right) &=& \prod_{p} \frac{1}{1+\frac{1}{p^2}+\frac{1}{p^4}+ \cdots} \\
27 &=& \prod_{p} \left( 1 + \frac{1}{p^2} + \frac{1}{p^4} + \cdots \right)^{-1} \\
28 &=& \left( \prod_{p} \left( 1 + \frac{1}{p^2} + \frac{1}{p^4} + \cdots \right) \right)^{-1} \\
29 &=& \left( 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots \right)^{-1} \\
30 &=& \frac{6}{\pi^2} \\
31 \end{eqnarray*}
32 \end{document}

```

CH-9 8TH

INPUT

```
1 \documentclass{article}
2 \usepackage{graphicx}
3 \begin{document}
4 \begin{figure}
5     \centering
6     \includegraphics[width=0.5\linewidth]{aesthetics-in-photography-6.jp
7     \caption{BROWN VILLA}
8     \label{fig:enter-label}
9 \end{figure}
10 \end{document}
```

OUTPUT



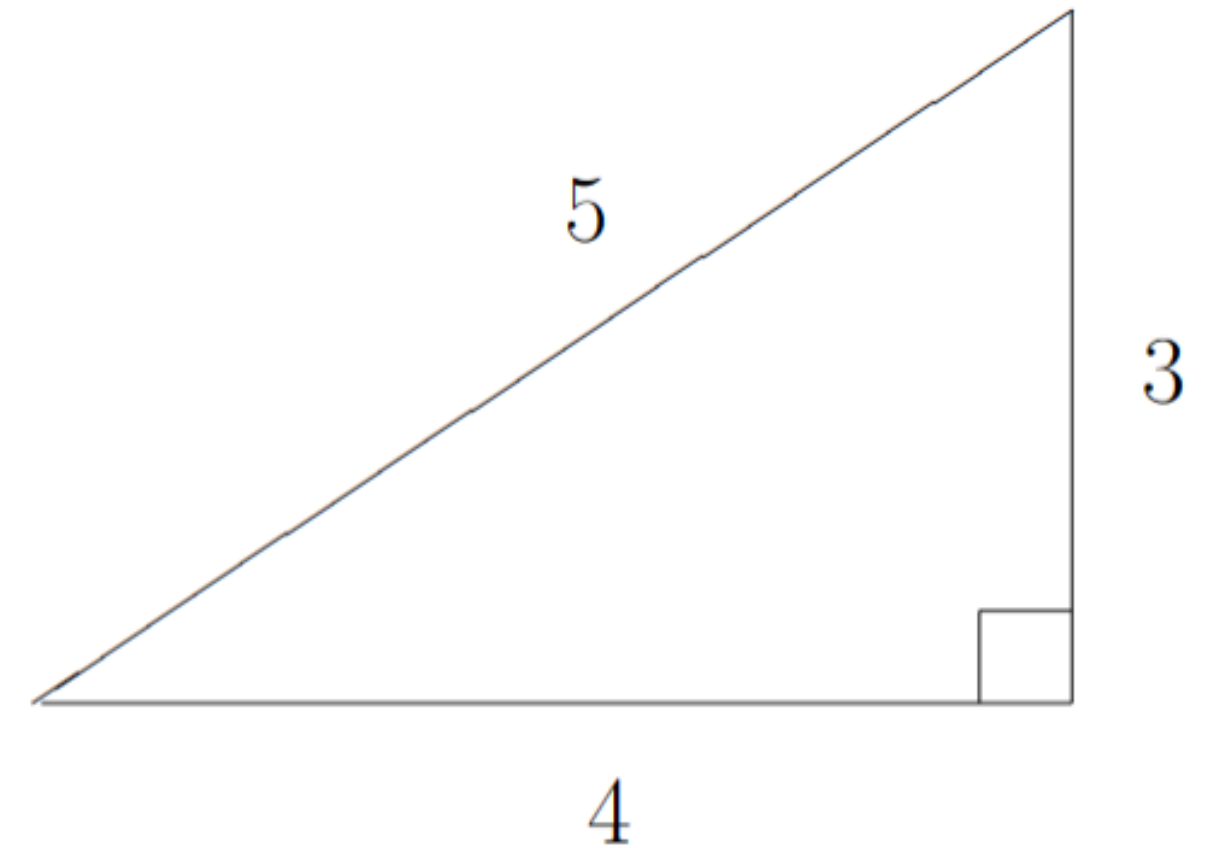
Figure 1: BROWN VILLA

INPUT

CH-9 9TH

OUTPUT

```
1 \documentclass{article}
2
3 \begin{document}
4 \begin{picture}(250,75)
5 \put(-13,10) {\line(1,0){223}}
6 \put(210,10) {\line(0,1){150}}
7 \put(210,160) {\line(-3, -2){225}}
8 \put(190,30) {\line(1,0){20}}
9 \put(190,30) {\line(0,-1){20}}
10
11
12 % Labels for sides
13 \put(105,-20){\huge 4} % Label for base (4 units)
14 \put(225,75){\huge 3} % Label for height (3 units)
15 \put(100,110){\huge 5} % Label for hypotenuse (5 units)
16 \end{picture}
17
18
19 \end{document}
```

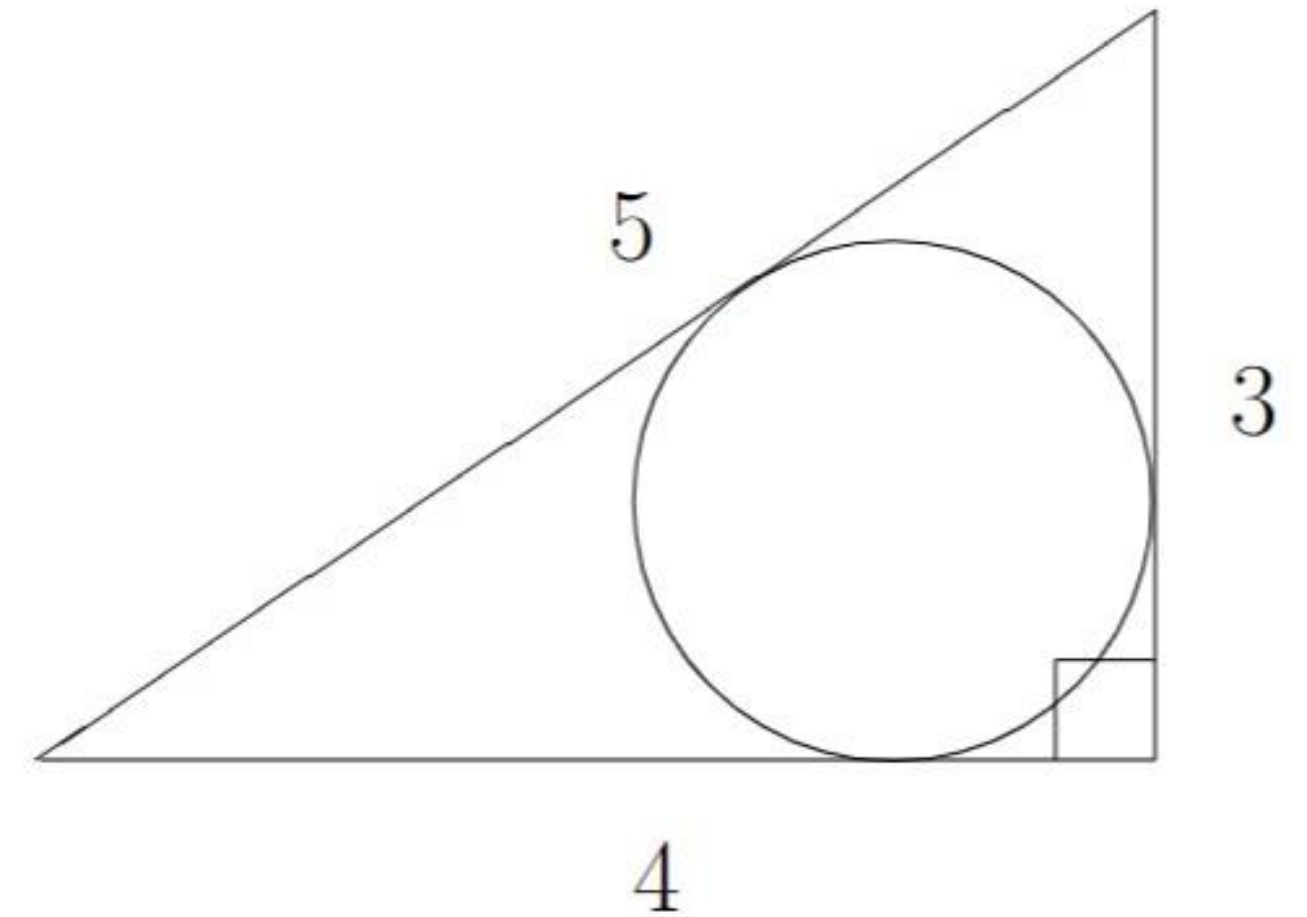


INPUT

CH-9 10TH

```
1 \documentclass{article}
2 \usepackage{tikz}
3
4 \begin{document}
5
6 \begin{picture}(250,75)
7 \put(-14,10) {\line(1,0){224}}
8 \put(210,10) {\line(0,1){150}}
9 \put(210,160) {\line(-3,-2){225}}
10 \put(190,30) {\line(1,0){20}}
11 \put(190,30) {\line(0,-1){20}}
12
13 % Labels for sides
14 \put(105,-20){\huge 4} % Label for base (4 units)
15 \put(225,75){\huge 3} % Label for height (3 units)
16 \put(100,110){\huge 5} % Label for hypotenuse (5 units)
17 \end{picture}
18
19 \begin{tikzpicture}
20 \put(105,115) {\draw (180,180) circle (1.83cm);} % Draw a
    radius of 1cm
21 \end{tikzpicture}
22 \end{document}
```

OUTPUT



MISCELLANEOUS

INPUT

```
1 \documentclass{article}
2 \usepackage{xcolor}
3 \usepackage{lipsum}
4 \begin{document}
5 \section*{Colored Text and Page Example}
6
7 % Colored text
8 This is \textcolor{blue}{blue} text.
9 Some \textcolor{red}{red} words here.\\
10 % Colored background for a block of text
11 \colorbox{yellow}{%
12   \parbox{\linewidth}{%
13     This block of text has a yellow background. It's colored with the
14     \texttt{\colorbox} command.\lipsum[1-2]%
15   }%
16 }
```

OUTPUT

Colored Text and Page Example

This is blue text. Some red words here.

This block of text has a yellow background. It's colored with the `\colorbox` command. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

INPUT

MISCELLANEOUS

OUTPUT

```
1 \documentclass{article}
2 \usepackage{multicol}
3 \usepackage{lipsum}
4 \begin{document}
5 \begin{multicols}{3}
6 \section{Three Columns}
7 This text is in three columns.
8 \lipsum[6-7]\\\\ % More dummy text
9 \end{multicols}
10
11 \begin{multicols}{2}
12 \section{Two Columns}
13 This text is in three columns.
14 \lipsum[6-7] % More dummy text
15 \end{multicols}
16 \end{document}
```

1 Three Columns

This text is in three columns. Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et con-

vallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo

eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

2 Two Columns

This text is in three columns. Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

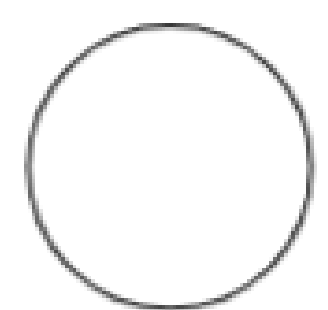
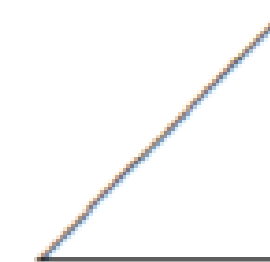
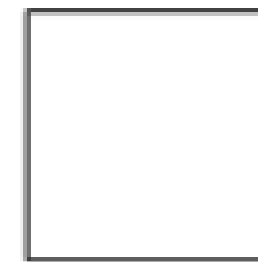
Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

INPUT

MISCELLANEOUS

```
1 \documentclass{article}
2 \usepackage{tikz}
3 \begin{document}
4
5 \begin{picture}(250,75)
6 % draw triangle
7 \put(100,0){\line(1,0){50}}
8 \put(150,0){\line(0,1){50}}
9 \put(150,50){\line(-1,-1){50}}
10 % draw square
11 \put(0,0){\line(1,0){50}}
12 \put(50,0){\line(0,1){50}}
13 \put(50,50){\line(-1,0){50}}
14 \put(0,50){\line(0,-1){50}}
15 % draw circle
16 \begin{tikzpicture}
17 \put(220, -10 ) { \draw (180,180) circle (1cm);}
18 radius of 1cm
19 \end{tikzpicture}
20 \end{picture}
21 \end{document}
```

OUTPUT



INPUT

MISCELLANEOUS

OUTPUT

```
1 \documentclass{article}
2
3 \begin{document}
4 \section*{Text Formatting Example}
5
6 This is a \textbf{Bold Text} \\
7 This is a \textit{Italic Text} \\
8 This is a \underline{Underlined Text} \\
9 This is a \texttt{Typewriter Text} \\
10 This is a \emph{ White rose and red word} \\
11
12 \section*{Font size }
13
14 This is a {\tiny Tiny Text} \\
15 This is a {\scriptsize Scriptsize Text} \\
16 This is a {\footnotesize Footnotesize Text} \\
17 This is a {\small Small Text} \\
18 This is a {\normalsize Normal Size Text} \\
19 This is a {\large Large Text} \\
20 This is a {\Large Larger Text} \\
21 This is a {\LARGE Very Large Text} \\
22 This is a {\huge Huge Text} \\
23 This is a {\Huge Very Huge Text} \\
24 \end{document}
```

Text Formatting Example

This is a **Bold Text**

This is a *Italic Text*

This is a Underlined Text

This is a `Typewriter Text`

This is a *White rose and red word*

Font size

This is a Tiny Text

This is a Scriptsize Text

This is a Footnotesize Text

This is a Small Text

This is a Normal Size Text

This is a Large Text

This is a Larger Text

This is a Very Large Text

This is a Huge Text

This is a Very Huge Text