Lab 5

Research Methodology in Computer Science

By completing the exercises, you should be able to:

- create a simple flowchart using LATEX
- add colours to the flowchart components

In this exercise, we're going to be looking at creating flowcharts in TikZ.
To get started we need to load up the

- **tikz package**,
- the **shapes.geometric** TikZ library
- the **arrows** library

```
\usepackage{tikz}
\usetikzlibrary{shapes.geometric, arrows}
```

\tikzstyle{startstop}= [rectangle, rounded corners,
minimum width=3cm, minimum height=1cm,
text centered, draw=black, fill=red!30]

Component	Meaning
\tikzstyle{startstop}= [...]	Creates a new style named **startstop** that you can later apply to TikZ nodes (like shapes in a flowchart).
rectangle	The shape of the node is a **rectangle**.
rounded corners	The corners of the rectangle are slightly **rounded**, giving a smoother look (often used for start/stop boxes in flowcharts).
minimum width=3cm	Ensures the rectangle is at least **3 cm wide**.
minimum height=1cm	Ensures the rectangle is at least **1 cm tall**.
text centered	Centers any **text** inside the shape.
draw=black	Draws the border of the shape with **black color**.
fill=red!30	Fills the shape with **30% red color** (a light red shade).

Basic Shapes (always available)

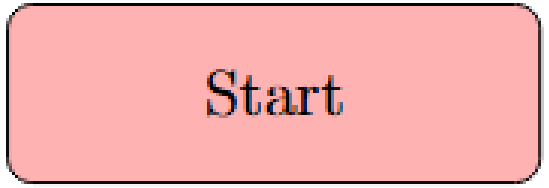
Shape	Description	Example usage
rectangle	A basic rectangular box	[rectangle]
circle	A circular node	[circle]
ellipse	An oval shape	[ellipse]
coordinate	An invisible point (for positioning)	[coordinate]
diamond	A diamond (useful for decision nodes)	[diamond]

Geometric Shapes

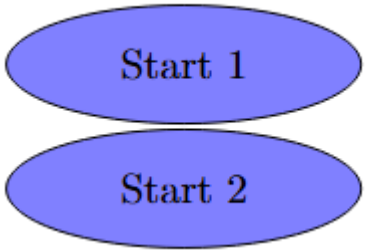
\usetikzlibrary{shapes.geometric}

Shape	Description	Example usage
trapezium	Trapezoid shape	[trapezium]
parallelogram	Parallelogram shape	[parallelogram]
regular polygon	Polygon (customizable sides)	[regular polygon, regular polygon sides=6]
star	Star shape (customizable points)	[star, star points=5]
isosceles triangle	Triangle shape	[isosceles triangle]

```
\begin{tikzpicture}[node distance=2cm]
\node (start) [startstop] {Start};
\end{tikzpicture}
```

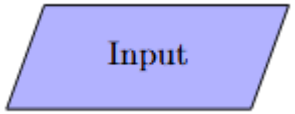


Part	Meaning
\node	Tells TikZ to create a **node** (a shape with text).
(start)	Assigns the **name/label "start"** to this node — useful for connecting to it later (like \draw [arrow] (start) -- (process);).
[startstop]	Applies the **style** named startstop (which you defined earlier). That style controls how the node looks (rounded rectangle, red fill, centered text, etc.).
{Start}	The **text content** inside the node. It appears centered within the shape.
;	Ends the TikZ command.

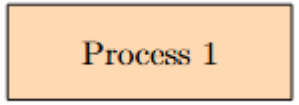


Write the LaTex scripts for these 2 nodes

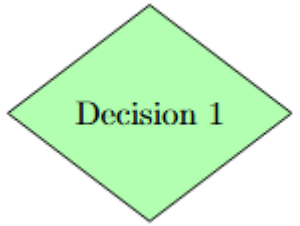
```
\tikzstyle{io} = [trapezium, trapezium left angle=70,
trapezium right angle=110, minimum width=3cm,
minimum height=1cm, text centered, draw=black,
fill=blue!30]
```




```
\tikzstyle{process} = [rectangle, minimum width=3cm,
minimum height=1cm, text centered, draw=black,
fill=orange!30]
```

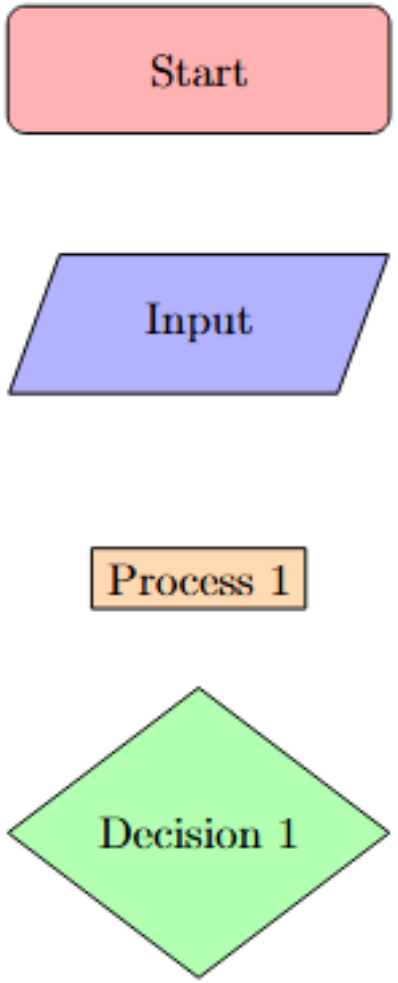



```
\tikzstyle{decision} = [diamond, minimum width=3cm,
minimum height=1cm, text centered, draw=black,
fill=green!30]
```



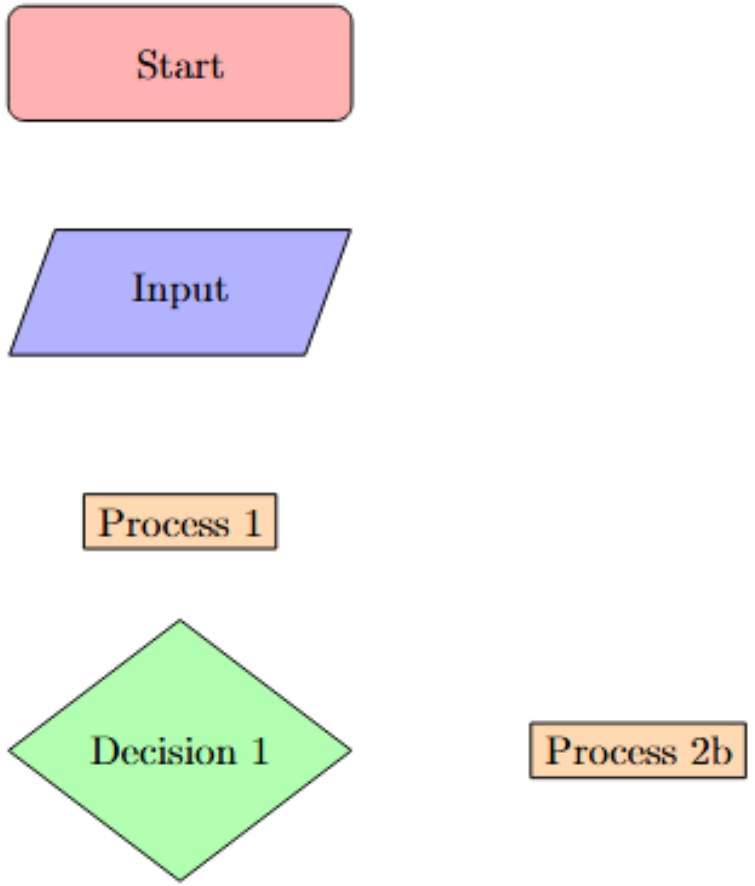

```
\tikzstyle{arrow} = [thick,->,>=stealth]
```

```
\begin{document}

\tikzstyle{arrow}= [thick,->,>=stealth]\begin{tikzpicture}[node distance=2cm]
... your codes here...
\end{tikzpicture}

\begin{tikzpicture}[node distance=2cm]
\node (start) [startstop] {Start};
\node (in1) [io, below of=start] {Input};
\node (pro1) [process, below of=in1] {Process 1};
\node (dec1) [decision, below of=pro1] {Decision 1};
\end{tikzpicture

end{document}
```



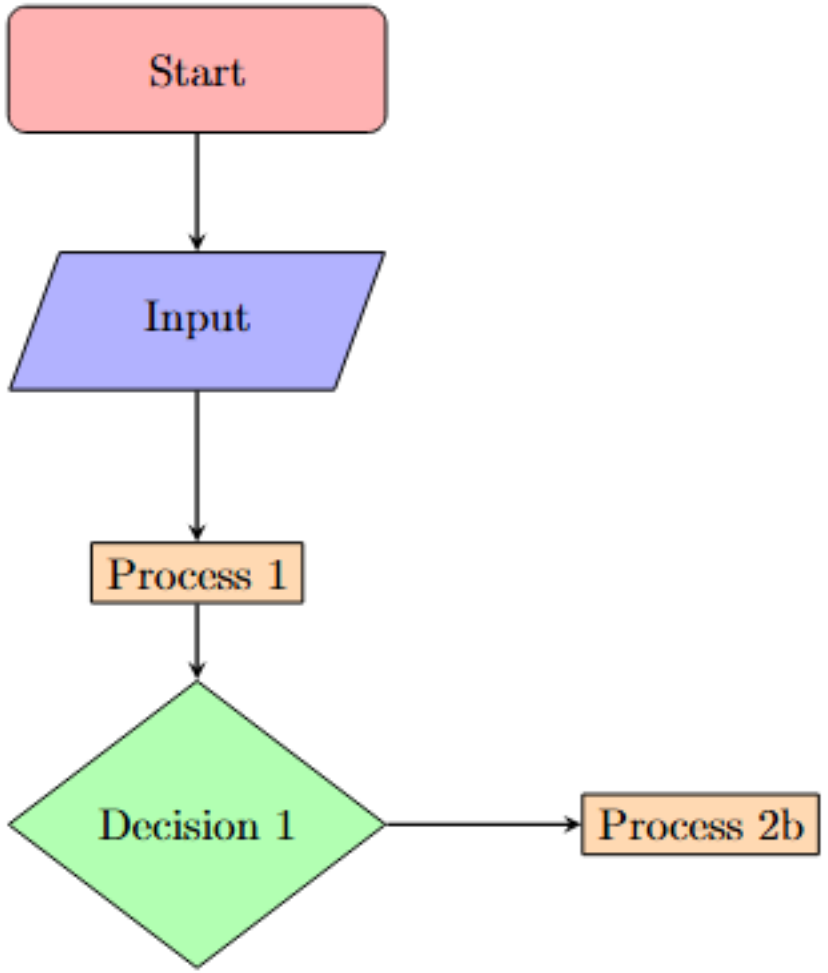
Let’s add one process node to the right of decision node, by adding the following code:

```
\node (pro2b) [process, right of=dec1, xshift=2cm] {Process 2b};
```



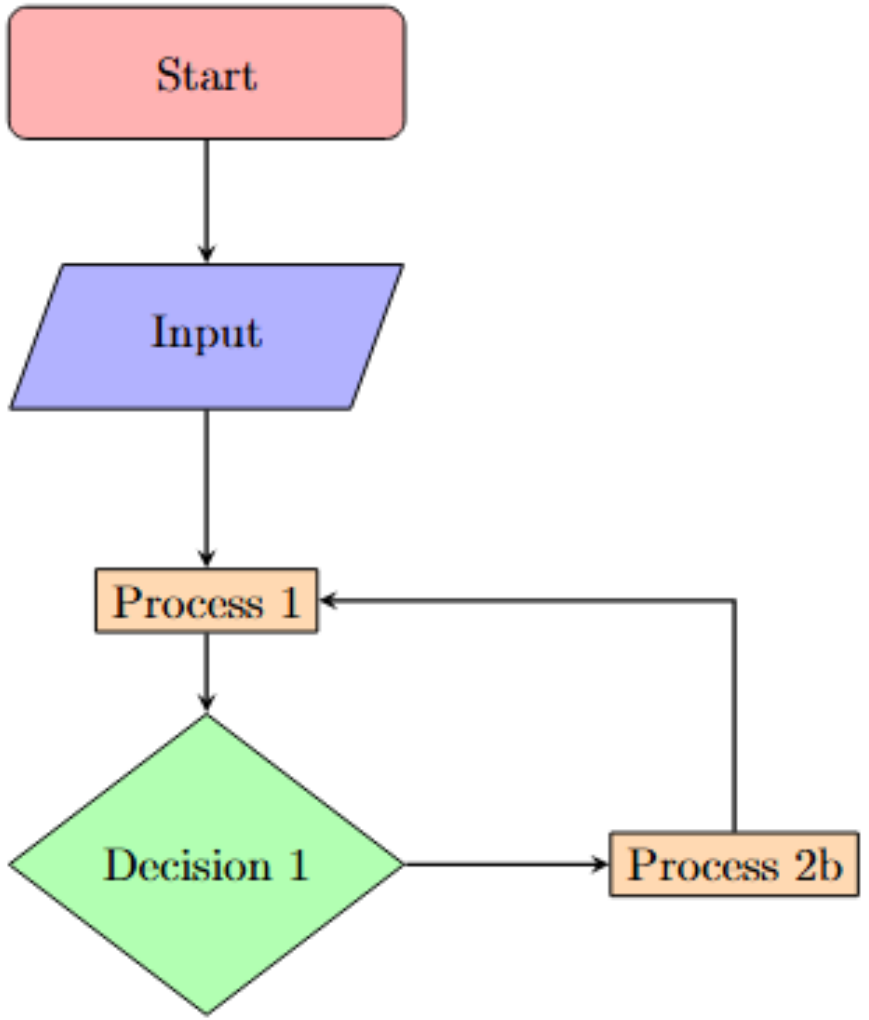
Let’s add arrows to the code

```
\draw [arrow] (start) -- (in1);
\draw [arrow] (in1) -- (pro1);
\draw [arrow] (pro1) -- (dec1);
\draw [arrow] (dec1) -- (pro2b);
```



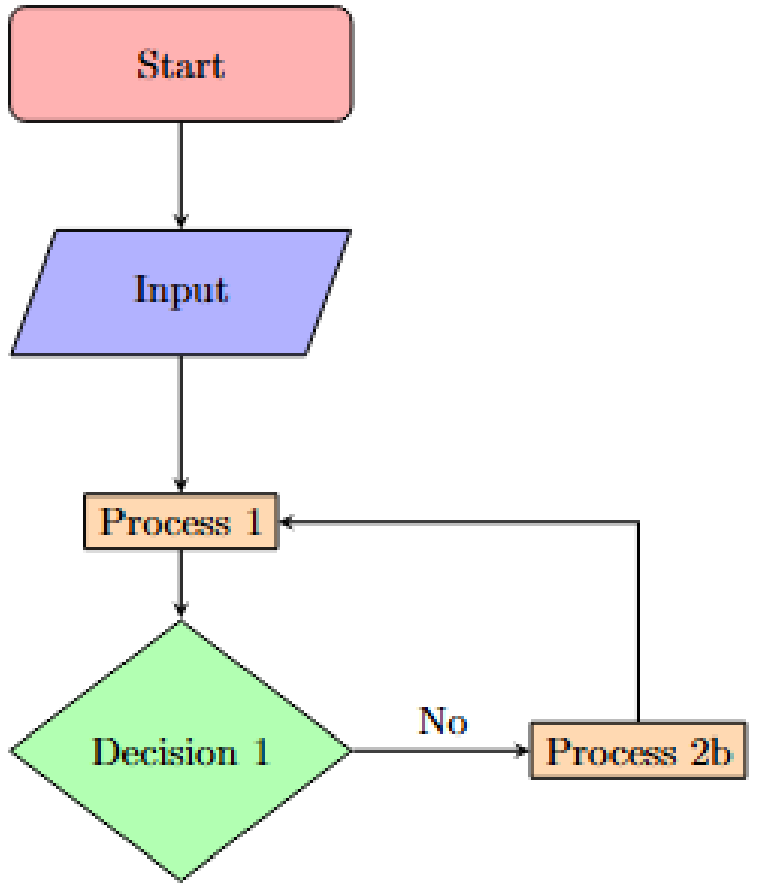
Let’s us add one line from “Process 2b” to “Process 1”

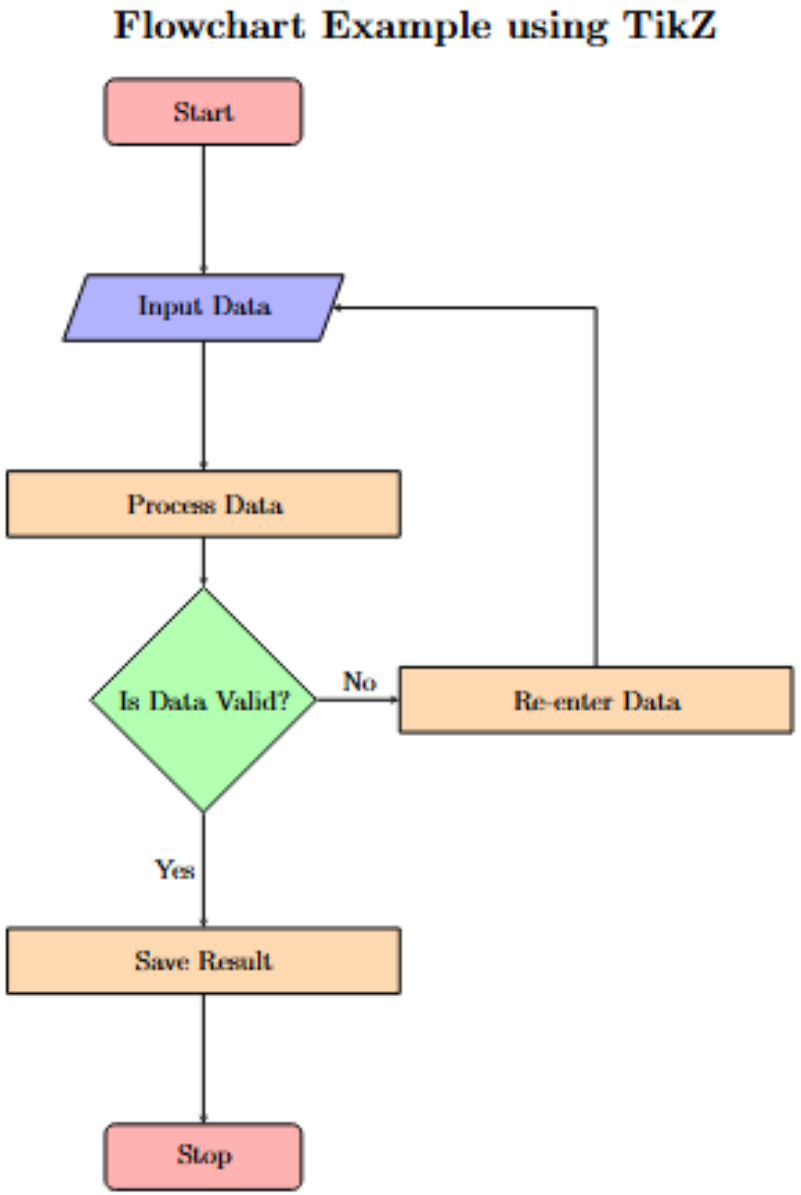
\draw [arrow] (pro2b) |- (pro1);



Syntax:
\draw [arrow] (from) -- node[anchor=POSITION] {LABEL} (to);

\draw [arrow] (dec1) -- node[anchor=south]{No} (pro2b);





Write the LaTex scripts to produce the required output