Lecture 9 - TikZ and pgf

LaTeX for Math and Science
Christian Blanco and Brandon Eltiste

Spring 2011 Lecture 7

Outline

What is TikZ?

- A package for creating pictures (Show examples).
- Create anything from rectangles, circles to Koch snowflakes, 3D graphs and animations.

What is Ti*k*Z?

- A package for creating pictures (Show examples).
- Create anything from rectangles, circles to Koch snowflakes, 3D graphs and animations.

Before We Get Started

- You need to add `\usepackage{tikz}` into your preamble. Other commands to put in preamble will be discussed later.

- When creating a picture use the `tikzpicture` environment. E.g.:

  ```
  \begin{tikzpicture}
      ...
  \end{tikzpicture}
  ```

Before We Get Started

- You need to add `\usepackage{tikz}` into your preamble. Other commands to put in preamble will be discussed later.
- When creating a picture use the `tikzpicture` environment. E.g.:

  ```
  \begin{tikzpicture}
      ...
  \end{tikzpicture}
  ```

Getting Started with Basic Examples

- ```
  \begin{tikzpicture}
      \draw[line width=2pt,color=red]
          (1,0) -- (0,0) -- (0,1);
  \end{tikzpicture}
  ```

-

- ```
  \begin{tikzpicture}
      \draw[line width=2pt,color=red]
          (1,0) -- (0,0) -- (0,1) -- cycle;
  \end{tikzpicture}
  ```

-

- **Note:** Don't forget the semicolons.

Getting Started with Basic Examples

- ```
  \begin{tikzpicture}
      \draw[line width=2pt,color=red]
          (1,0) -- (0,0) -- (0,1);
  \end{tikzpicture}
  ```

-

  ```
  \begin{tikzpicture}
      \draw[line width=2pt,color=red]
          (1,0) -- (0,0) -- (0,1) -- cycle;
  \end{tikzpicture}
  ```

-

- **Note:** Don't forget the semicolons.

Getting Started with Basic Examples

- \begin{tikzpicture}
      \draw[line width=2pt,color=red]
          (1,0) -- (0,0) -- (0,1);
  \end{tikzpicture}

-

- \begin{tikzpicture}
      \draw[line width=2pt,color=red]
          (1,0) -- (0,0) -- (0,1) -- cycle;
  \end{tikzpicture}

-

- **Note:** Don't forget the semicolons.

Getting Started with Basic Examples

- ```
  \begin{tikzpicture}
      \draw[line width=2pt,color=red]
          (1,0) -- (0,0) -- (0,1);
  \end{tikzpicture}
  ```

-

- ```
  \begin{tikzpicture}
      \draw[line width=2pt,color=red]
          (1,0) -- (0,0) -- (0,1) -- cycle;
  \end{tikzpicture}
  ```

-
- **Note:** Don't forget the semicolons.

Getting Started with Basic Examples

- ```
  \begin{tikzpicture}
      \draw[line width=2pt,color=red]
          (1,0) -- (0,0) -- (0,1);
  \end{tikzpicture}
  ```

-

- ```
  \begin{tikzpicture}
      \draw[line width=2pt,color=red]
          (1,0) -- (0,0) -- (0,1) -- cycle;
  \end{tikzpicture}
  ```

-

- **Note:** Don't forget the semicolons.

Getting Started with Basic Examples

- ```
  \begin{tikzpicture}
      \fill[line width=1pt,color=blue]
          (0,0) {[rounded corners]
              -- (0,1)} -- (1,0);
  \end{tikzpicture}
  ```

-
- ```
  \begin{tikzpicture}
      \fill[line width=1pt,color=blue]
          (0,0) {[rounded corners]
              -- (0,1) -- (1,0)} -- cycle;
  \end{tikzpicture}
  ```

-

Getting Started with Basic Examples

- ```
  \begin{tikzpicture}
      \fill[line width=1pt,color=blue]
          (0,0) {[rounded corners]
              -- (0,1)} -- (1,0);
  \end{tikzpicture}
  ```

-

- ```
  \begin{tikzpicture}
      \fill[line width=1pt,color=blue]
          (0,0) {[rounded corners]
              -- (0,1) -- (1,0)} -- cycle;
  \end{tikzpicture}
  ```

-

Getting Started with Basic Examples

- ```
  \begin{tikzpicture}
      \fill[line width=1pt,color=blue]
          (0,0) {[rounded corners]
              -- (0,1)} -- (1,0);
  \end{tikzpicture}
  ```

-

- ```
  \begin{tikzpicture}
      \fill[line width=1pt,color=blue]
          (0,0) {[rounded corners]
              -- (0,1) -- (1,0)} -- cycle;
  \end{tikzpicture}
  ```

-

Getting Started with Basic Examples

- ```
  \begin{tikzpicture}
      \fill[line width=1pt,color=blue]
          (0,0) {[rounded corners]
              -- (0,1)} -- (1,0);
  \end{tikzpicture}
  ```

-

- ```
  \begin{tikzpicture}
      \fill[line width=1pt,color=blue]
          (0,0) {[rounded corners]
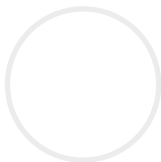   -- (0,1) -- (1,0)} -- cycle;
  \end{tikzpicture}
  ```

-

## More Getting Started with Basic Examples

- ```
  \begin{tikzpicture}
      \fill[line width=1pt,color=blue]
           (0,0) rectangle (2,1);
  \end{tikzpicture}
  ```

-

- ```
  \begin{tikzpicture}
      \draw[line width=2pt,color=gray]
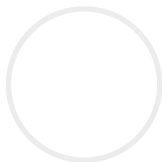   (0,0) circle[radius=1];
  \end{tikzpicture}
  ```

-

## More Getting Started with Basic Examples

- ```
  \begin{tikzpicture}
       \fill[line width=1pt,color=blue]
             (0,0) rectangle (2,1);
  \end{tikzpicture}
  ```

-

- ```
  \begin{tikzpicture}
       \draw[line width=2pt,color=gray]
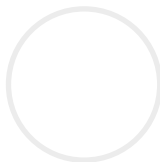   (0,0) circle[radius=1];
  \end{tikzpicture}
  ```

-

# More Getting Started with Basic Examples

- `\begin{tikzpicture}`
  `    \fill[line width=1pt,color=blue]`
  `        (0,0) rectangle (2,1);`
  `\end{tikzpicture}`

- 

- `\begin{tikzpicture}`
  `    \draw[line width=2pt,color=gray]`
  `        (0,0) circle[radius=1];`
  `\end{tikzpicture}`

-

## More Getting Started with Basic Examples

- ```
  \begin{tikzpicture}
      \fill[line width=1pt,color=blue]
          (0,0) rectangle (2,1);
  \end{tikzpicture}
  ```

-

- ```
  \begin{tikzpicture}
      \draw[line width=2pt,color=gray]
          (0,0) circle[radius=1];
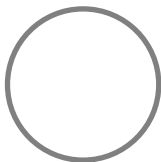 \end{tikzpicture}
  ```

-

## TikZ Libraries

- To provide simpler methods to create complex structures libraries for TikZ has `\usetikzlibary`
- Different examples are: `decorations.fractals`, `arrows`, `backgrounds`, `intersections` and `shapes.geometric`.
- And now for some examples using these...

- First you must add `\usetikzlibrary{backgrounds}` to your preamble

```
\begin{tikzpicture}
    [background rectangle/.style={fill=blue!20,
        draw=blue!50,line width=3pt},
        show background rectangle]
    \draw[line width=2pt,color=gray]
        (2,2) circle[radius=1];
\end{tikzpicture}
```

- **First you must add** `\usetikzlibrary{backgrounds}` to your preamble

```
\begin{tikzpicture}
    [background rectangle/.style={fill=blue!20,
        draw=blue!50,line width=3pt},
        show background rectangle]
    \draw[line width=2pt,color=gray]
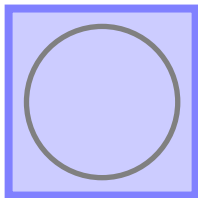        (2,2) circle[radius=1];
\end{tikzpicture}
```

- **First you must add** `\usetikzlibrary{backgrounds}` to your preamble

```
\begin{tikzpicture}
    [background rectangle/.style={fill=blue!20,
        draw=blue!50,line width=3pt},
        show background rectangle]
    \draw[line width=2pt,color=gray]
        (2,2) circle[radius=1];
\end{tikzpicture}
```

Koch Snowflake

- First you must add
  \usetikzlibrary{decorations.fractals} to your
  preamble

- \begin{tikzpicture}[decoration=Koch
      snowflake,draw=blue,fill=blue!20,thick]
      \filldraw decorate{ decorate{ (0,0) --
          ++(60:1) -- ++(-60:1) -- cycle}};
  \end{tikzpicture}

-

LATEX for Math and Science Christian Blanco and Brandon Eltiste   Lecture 9 - TikZ and pgf

Koch Snowflake

- First you must add
  `\usetikzlibrary{decorations.fractals}` to your
  preamble
- `\begin{tikzpicture}[decoration=Koch`
  `    snowflake,draw=blue,fill=blue!20,thick]`
  `    \filldraw decorate{ decorate{ (0,0) --`
  `        ++(60:1) -- ++(-60:1) -- cycle}};`
  `\end{tikzpicture}`

-

Koch Snowflake

- First you must add
  `\usetikzlibrary{decorations.fractals}` to your
  preamble

- ```
  \begin{tikzpicture}[decoration=Koch
      snowflake,draw=blue,fill=blue!20,thick]
      \filldraw decorate{ decorate{ (0,0) --
          ++(60:1) -- ++(-60:1) -- cycle}};
  \end{tikzpicture}
  ```

-

Don't forget

- At the end of each statement put a semi-colon.

- Don't forget to put the correct TikZ library in your preamble.

Resources

- PGF Manual

- TikZ Examples

- Extra TikZ slides

Homework

- Homework