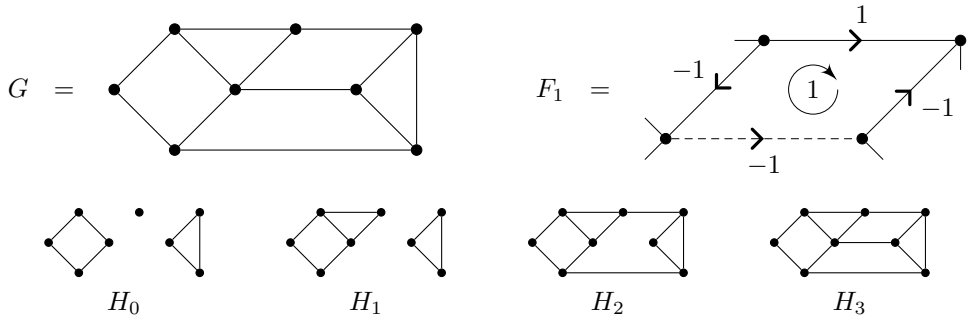
TikZ and You:

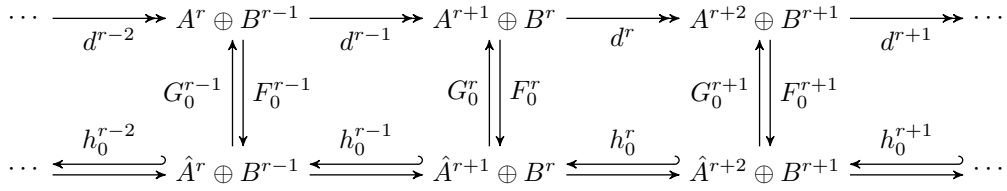
How to get the most out of code-generated graphics



What power does the LaTeX graphics package TikZ give you?

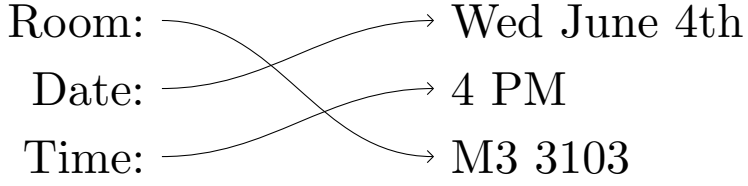
An introductory talk with examples and full constructions from algebra, combinatorics, graph theory, and more.

No previous knowledge of TikZ necessary!



For more information about this talk, visit

`math.uwaterloo.ca/~jlazovsk/tikz`



Turn over for source code

```
\documentclass{ltxdoc}
\usepackage[paperwidth=8.5in,paperheight=11in,
  margin=0in]{geometry}
\usepackage{tikz,amssymb,amsmath,hyperref}
\usetikzlibrary{calc,arrows.meta,decorations.markings,
  arrows,shapes}
\tikzset{nnode/.style={circle,draw=black,inner sep=1.4pt
  ,fill}}
\tikzset{snnode/.style={circle,draw=black,inner sep=.55pt
  ,fill}}
\newcommand{\cw}[1]{\draw[decoration={markings,
  mark=at position 0.999 with {\arrow[very thick]{>}}},
  postaction={decorate},shorten >=1.5pt] (#1) ++(.25,0)
  arc (360:30:.25) -- ++(-45:1pt);}
\tikzset{midarr/.style={-,decoration={markings,
  mark=at position 0.5 with {\arrow[very thick]{angle 90}}},
  postaction={decorate}}}
\newcommand\tt{scale=1.8}\newcommand\vD{1.5}\newcommand\hD{2}

\begin{document}\thispagestyle{empty}${}$\vspace{.8cm}
\begin{center}\begin{tikzpicture}
\node[scale=7] (title) at (0,0) {TikZ and You:};
\node[scale=1.9] at (0,-1.7) {How to get the most
  out of code-generated graphics};
\end{tikzpicture}\end{center}\vfill\[ G\ \ = \ \ \
\begin{tikzpicture}[baseline=-.1cm,scale=.8]
\foreach \i\j\k in {0/0/a,1/1/b,1/-1/c,2/0/d,3/1/e,4/0/f,
  5/1/g,5/-1/h}{\node[nnode] (\k) at (\i,\j) {};}
\foreach \i\j in {a/b,a/c,b/d,c/d,d/e,b/e,e/g,g/f,d/f,
  f/h,g/h,c/h}{\draw (\i) to (\j);}
\end{tikzpicture}\hspace{1.5cm} F_1\ \ = \ \ \
\begin{tikzpicture}[scale=1.3,baseline=.55cm,
  line width=0.3pt,>=latex']
\foreach \i\j\k in {2/0/d,3/1/e,4/0/f,5/1/g}{
  \node[nnode] (\k) at (\i,\j) {};}
\draw[midarr] (e) to node[auto,swap] {$-1$} (d);
\draw[midarr,densely dashed] (d) to node[below=3pt]
  {$-1$} (f);
\draw[midarr] (e) to node[above=3pt] {$1$} (g);
\draw[midarr] (f) to node[auto,swap] {$-1$} (g);
\node (x) at (3.5,.5) {1}; \cw x
\foreach \i\j in {d/135,d/225,e/180,g/270,f/315}{
  \draw (\i)--+(\j:.3);}
\end{tikzpicture}\]\begin{center}\begin{tikzpicture}[scale=.4]
\node (eq) at (2.5,-2) {$H_0$};
\foreach \i\j\k in {0/0/a,1/1/b,1/-1/c,2/0/d,3/1/e,4/0/f,
  5/1/g,5/-1/h}{
  \node[nnode,inner sep=1pt] (\k) at (\i,\j) {};}
\foreach \i\j in {a/b,a/c,b/d,c/d,g/f,f/h,g/h}{
  \draw (\i) to (\j);}
\begin{scope}[shift={(8,0)}]
\node (eq) at (2.5,-2) {$H_1$};
\foreach \i\j\k in {0/0/a,1/1/b,1/-1/c,2/0/d,3/1/e,4/0/f,
  5/1/g,5/-1/h}{
  \node[nnode,inner sep=1pt] (\k) at (\i,\j) {};}
\foreach \i\j in {a/b,a/c,b/d,c/d,d/e,b/e,g/f,f/h,g/h}{
  \draw (\i) to (\j);}
\end{scope}\begin{scope}[shift={(16,0)}]
\node (eq) at (2.5,-2) {$H_2$};
\foreach \i\j\k in {0/0/a,1/1/b,1/-1/c,2/0/d,3/1/e,4/0/f,
  5/1/g,5/-1/h}{
  \node[nnode,inner sep=1pt] (\k) at (\i,\j) {};}
\foreach \i\j in {a/b,a/c,b/d,c/d,d/e,b/e,e/g,g/f,f/h,
  g/h,c/h}{\draw (\i) to (\j);}
\end{scope}\begin{scope}[shift={(24,0)}]
\node (eq) at (2.5,-2) {$H_3$};
\foreach \i\j\k in {0/0/a,1/1/b,1/-1/c,2/0/d,3/1/e,4/0/f,
  5/1/g,5/-1/h}{
  \node[nnode,inner sep=1pt] (\k) at (\i,\j) {};}
\foreach \i\j in {a/b,a/c,b/d,c/d,d/e,b/e,e/g,g/f,d/f,
  f/h,g/h,c/h}{\draw (\i) to (\j);}
\end{scope}\end{tikzpicture}\end{center}
\vfill\begin{center}\begin{tikzpicture}
\node[scale=1.4] at (0,0) {\parbox{4in}{\centering
What power does the LaTeX graphics package TikZ give
you? \\[2ex]An introductory talk with examples and
full constructions from algebra, combinatorics, graph
theory, and more.\\[2ex] No previous knowledge of
TikZ necessary!}};
\end{tikzpicture}\end{center}\vfill\[
\begin{tikzpicture}\begin{scope}[line width=0.5pt,
>=stealth',shift={(-6.5,-1.6)}]
\node (a0) at (0,0) {$\cdots$};
\node[anchor=west] (b0) at ($(a0.east)+(0:\vD)$)
  {$A^r\oplus B^{r-1}$};
\node[anchor=west] (c0) at ($(b0.east)+(0:\vD)$)
  {$A^{r+1}\oplus B^{r}$};
\node[anchor=west] (d0) at ($(c0.east)+(0:\vD)$)
  {$A^{r+2}\oplus B^{r+1}$};
\node[anchor=west] (e0) at ($(d0.east)+(0:\vD)$)
  {$\cdots$};
\node (a1) at ($(a0)+(270:\hD)$) {$\cdots$};
\node (b1) at ($(b0)+(270:\hD)$)
  {$\hat A^{r}\oplus B^{r-1}$};
\node (c1) at ($(c0)+(270:\hD)$)
  {$\hat A^{r+1}\oplus B^r$};
\node (d1) at ($(d0)+(270:\hD)$)
  {$\hat A^{r+2}\oplus B^{r+1}$};
\node (e1) at ($(e0)+(270:\hD)$) {$\cdots$};
\foreach \z\y\w in {a/b/r-2,b/c/r-1,c/d/r,d/e/r+1}{
  \draw[->>] (\z0) to node[below] {$ d^{\w}$} (\y0);
  \draw[->,transform canvas={yshift=-2pt}] (\z1)--(\y1);}
\foreach \z\y\w in {a/b/r-2,b/c/r-1,c/d/r,d/e/r+1}{
  \draw[left hook->,transform canvas={yshift=2pt}]
  (\y1) to node[above] {$ h^{\w}_0$} (\z1);}
\foreach \x\z in {b/r-1,c/r,d/r+1}{
  \draw[->,transform canvas={xshift=-2pt}] (\x1) to
    node[left] {$ G^{\z}_0$} (\x0);
  \draw[->,transform canvas={xshift=2pt}] (\x0) to
    node[right] {$ F^{\z}_0$}  (\x1);}
\end{scope}\end{tikzpicture} \]
\vfill\begin{center}\begin{tikzpicture}
\node[scale=1.4] at (0,0) {\parbox{5.5in}{\centering
  For more information about this talk, visit
  \\[.5ex]\url{math.uwaterloo.ca/~jlazovsk/tikz}}};
\begin{scope}[scale=\tt,>=stealth,shift={(0,-2.4)}]
\node[anchor=east,\tt] (a1) at (-1,1.5) {Room:};
\node[anchor=east,\tt] (a2) at (-1,1) {Date:};
\node[anchor=east,\tt] (a3) at (-1,.5) {Time:};
\node[anchor=west,\tt] (b1) at (1,1.5) {Wed June 4th};
\node[anchor=west,\tt] (b2) at (1,1) {4 PM};
\node[anchor=west,\tt] (b3) at (1,.5) {M3 3103};
\foreach \x\y in {a1/b3,a2/b1,a3/b2}{\draw[->,
  >={Straight Barb}] (\x) to [out=0,in=180] (\y);}
\end{scope}\end{tikzpicture}\end{center}\begin{center}
\scalebox{.5}{Turn over for resulting document}
\end{center}\vspace{.4cm}${}$\end{document}
```