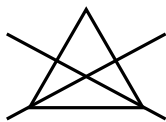# My setup for this presentation:

```
\usepackage{amssymb,mathtools,amsmath}
\usepackage{alphalph,ifthen,intcalc,verbatim}
\usepackage[dvipsnames,svgnames]{xcolor}

\usepackage{tikz}  \usepackage{tikz-among-us}
\usetikzlibrary{positioning, patterns, calc,
    decorations.pathmorphing,
    decorations.pathreplacing, cd}
\usepackage[linguistics]{forest}

\usepackage{tcolorbox}
\tcbuselibrary{listings}
```

GitHub repository:

```
https://github.com/boris-a-zolotov/tikz-lesson
```

```
\definecolor{stiralka}{RGB}{8,10,63}


%    Do not bleach
\begin{tikzpicture}[scale=1.5]
    \draw[very thick]
        (0,{sqrt(3)/2})  --  (-0.5,0)
        --  (0.5,0)  --  cycle;
    \draw[very thick]
        (-0.7,0.65)  --  ++(1.4,-0.75);
    \draw[very thick,xscale=-1]
        (-0.7,0.65)  --  ++(1.4,-0.75);
\end{tikzpicture} \vspace{4cm}


%    Tumble dry, no heat
\begin{tikzpicture}[scale=1.5]
    \fill[stiralka]  (0,0) circle[radius=0.4cm];
    \draw[very thick]  (-0.5,-0.5) rectangle (0.5,0.5);
\end{tikzpicture}
```

```
\begin{tikzpicture}[scale=1.5,very thick]
  %   Iron, high temperature
  \begin{scope}[yshift=-1cm]
    \draw  (0.25,0.75)  --  (0.85,0.75)
      --  (1,0)  coordinate[pos=0.4](a)
      --  (0,0)  to[out=70,in=170] (a);
    \foreach \i in {0,1,2}
      {\fill[black] (0.35+0.2*\i,0.22)
          circle[radius=0.5mm];}
  \end{scope}

  %   Water temperature 30 degrees
  \begin{scope}[yshift=-5cm,xshift=0.5cm]
    \draw  (-0.5,0.75)  --  (-0.35,0)
        coordinate[pos=0.3333](a)
        --  (0.35,0)  --  (0.5,0.75)
        coordinate[pos=0.6667](b);
    \draw[decorate,decoration={coil,amplitude=0.75mm,
        segment length=0.38cm,aspect=0}]  (a) -- (b);
    \draw (0,0.26) node{$\phantom{^{\circ}}30^{\circ}$};
  \end{scope}
\end{tikzpicture}
```
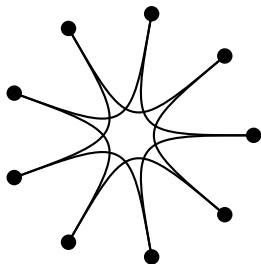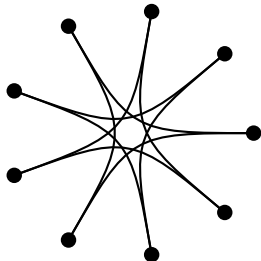
3

2

1

0

−1

−2

−3
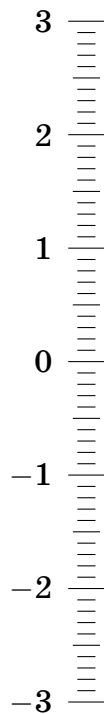
```
\draw
\foreach \c in {-3,...,2} {
    (0.16,\c) -- (-0.16,\c)
      node[left,inner sep=0.2cm]{\(\c\)}
    (0.12,\c+0.5) -- (-0.12,\c+0.5)
    \foreach \cc in {1,2,3,4,6,7,8,9}
        {(-0.08,\c + 0.1*\cc) -- ++(0.16,0)}
}   (0.16,3) -- (-0.16,3)
      node[left,inner sep=0.2cm]{\(3\)};
```
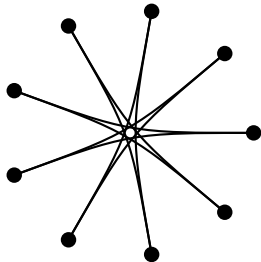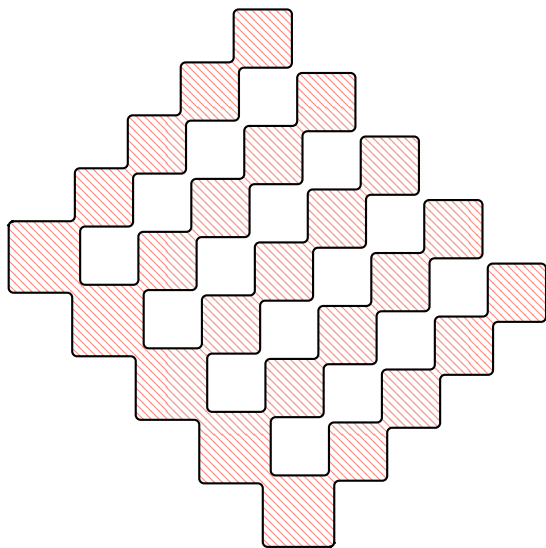
$(9,2)$

$(9,3)$

$(9,4)$

```
\foreach \j in {2,3,4} {
  \begin{scope}[yshift=-4.3 * \j cm]
    \draw (-1.6,1.4) node[left]{\( (9,\j) \)};

    \foreach \i in {0,...,8} {

      \fill[black] (360/9 * \i : 1.6cm)
        circle[radius=1mm];

      \draw[thick] (360/9 * \i : 1.6cm)
        .. controls (0,0) ..
        ({360/9 * (\i + \j)} : 1.6cm);

    }
  \end{scope}
}
```
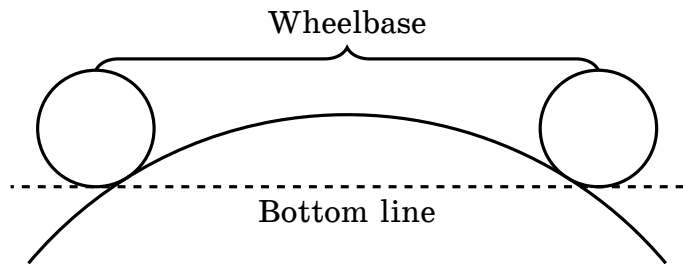
```
\newcommand{\sz}{4}

\draw[thick,rounded corners=0.65mm,
      pattern=north west lines,
      pattern color=Melon]    (0,0)
  \foreach \t in {0,...,{\sz}} {
    --  ++(0.55,0)  --  ++(0,0.5)
    \foreach \i in {2,...,{\sz}}
        {--  ++(0.5,0)  --  ++(0,0.5)}
    --  ++(0.55,0)  --  ++(0,-0.55)
    \foreach \i in {2,...,{\sz}}
        {--  ++(-0.5,0)  --  ++(0,-0.5)}
    --  ++(-0.5,0)  --  ++(0,-0.55)
  }

  --  ++(0,-0.075)  --  ++(-0.075,0)

  \foreach \t in {0,...,{\sz}}
      {--  ++(-0.6,0)  --  ++(0,0.6)}

  --  ++(0,0.075)  --  cycle;
```
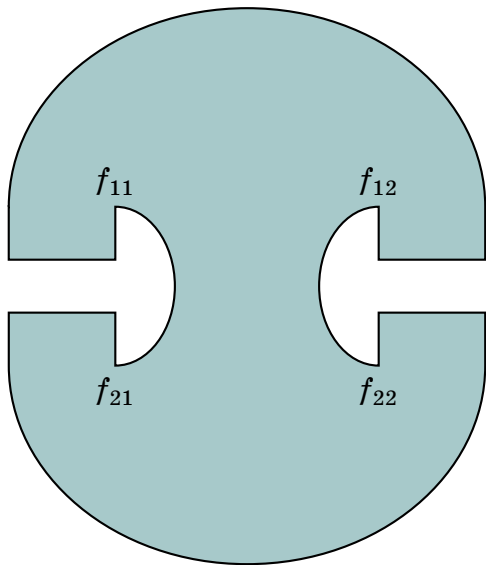
```
\begin{tikzpicture}[very thick,scale=0.55]
  \draw (40:10cm) arc (40:140:10cm);
  \draw (58:11.4cm) circle[radius=1.4cm]
        (122:11.4cm) circle[radius=1.4cm];

  \draw (58:11.4) ++(0,-1.4) coordinate(a);
  \draw (122:11.4) ++(0,-1.4) coordinate(b);

  \draw[dashed] (36:10cm |- a) -- (144:10cm |- b)
        node[midway,below]{Bottom line};

  \draw[decorate,decoration={brace,mirror,
        amplitude=3mm,raise=15.4mm}] (a) -- (b)
        node[midway,above,
             inner sep=20mm]{Wheelbase};
\end{tikzpicture}
```
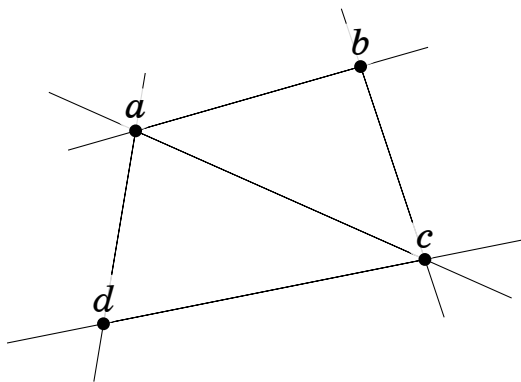
```
% Penrose Unilluminable Room

\newcommand{\aaxis}{3}
\newcommand{\baxis}{2.5}
\newcommand{\offset}{1}
\newcommand{\focus}{sqrt(\aaxis^2-\baxis^2)}

\filldraw[thick,draw=black,fill=CadetBlue,
          fill opacity=0.55,text opacity=1]
   (-\aaxis, \offset)
   arc(180:0:\aaxis cm and \baxis cm)
   --  ++(0, -\offset/1.5)  -|  ({\focus}, \offset)
       node[above]{$f_{12}$}
   arc(90:270:0.75*\offset cm and \offset cm)
       node[below]{$f_{22}$}
   --  ++(0, \offset/1.5)  -|  (\aaxis, -\offset)
   arc(0:-180:\aaxis cm and \baxis cm)
   --  ++(0, \offset/1.5)  -|  ({-\focus}, -\offset)
       node[below]{$f_{21}$}
   arc(-90:90:0.75*\offset cm and \offset cm)
       node[above]{$f_{11}$}
   --  ++(0, -\offset/1.5)  -|  cycle;
```

```
\newcommand{\namenode}[1]{
  \draw (#1) node[above,circle,fill=white,
        fill opacity=0.85,text opacity=1,
        inner sep=0.35ex]{{\large $#1$}}
    node[circle,fill=black,inner sep=0.6mm](#1){ }; }

\newcommand{\lconnect}[2]{\draw (#1) -- (#2)
   coordinate[pos=-0.3](#1f#2)
   coordinate[pos=1.3](#2f#1)
     (#1f#2) -- (#2f#1); }

\coordinate (a) at (0.5,3);  \coordinate (b) at (4,4);
\coordinate (c) at (5,1);    \coordinate (d) at (0,0);

\lconnect{a}{b}   \lconnect{b}{c}   \lconnect{c}{d}
\lconnect{d}{a}   \lconnect{a}{c}

\namenode{a} \namenode{b} \namenode{c} \namenode{d}
```

```
\foreach \x in {0,...,7}
  \foreach \y in {0,...,7} {
    \ifthenelse{\intcalcMod{\x+\y}{2}=0}
      {\fill[RawSienna!55!white]}
      {\fill[RawSienna!5!white]}
          (\x,\y) rectangle ++(1,1);
  }

\foreach \i in {1,...,8} {
  \node (a\i) at (\i-0.5, -0.5) {\AlphAlph{\i}};
  \node (d\i) at (-0.5, \i-0.5) {\i};
}

\draw[step=1cm, black] (0,0) grid (8,8);
```

```
\draw (-2.5,0) -- (2.5,0);

\draw (-0.08,0) node[Dandelion,fill=black,left,
    rectangle,inner xsep=0.6mm,inner ysep=2mm]{\Huge Aa};

\draw (0.08,0) node[Dandelion,fill=black,right,
    rectangle,inner xsep=0.6mm,inner ysep=2mm]{\Huge ag};

\draw (-2.5,-3.5) -- (2.5,-3.5);

\draw (-0.08,-3.5) node[Dandelion,fill=black,left,
    rectangle,inner xsep=0.6mm,inner ysep=2mm,
    text height=4ex,text depth=1ex]{\Huge Aa};

\draw (0.08,-3.5) node[Dandelion,fill=black,right,
    rectangle,inner xsep=0.6mm,inner ysep=2mm,
    text height=4ex,text depth=1ex]{\Huge ag};
```
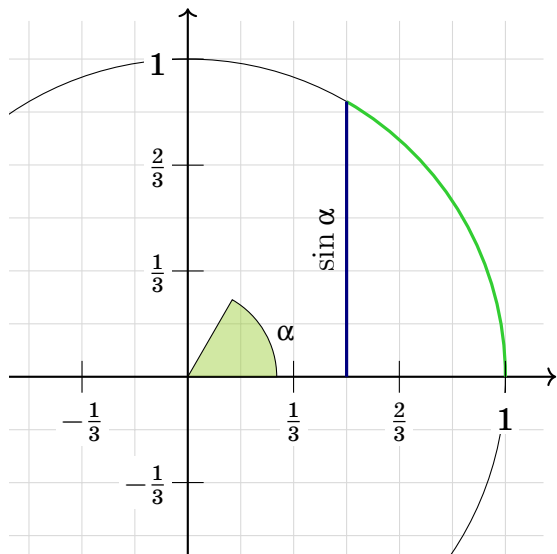
```
\clip (-0.56,-0.56) rectangle (1.16,1.16);

\foreach \x in {-6,...,6} {
  \draw[thin,black!15!white]  (-1.12, \x/6) --
    (1.12, \x/6) (\x/6, -1.12) -- (\x/6, 1.12);}
\draw[thick,->] (-1.16,0)--(1.16,0);
\draw[thick,->] (0,-1.16)--(0,1.16);
\draw (0,0) circle[radius=1cm];

\draw[very thick,LimeGreen] (0:1cm) arc (0:60:1cm);
\draw[very thick,NavyBlue] (60:1cm) -- (60:1cm |- 0,0)
  node[black,midway,above,rotate=90] {$\sin \alpha$};

\filldraw[fill=YellowGreen,fill opacity=0.45,
  draw=black] (0,0) -- (0.28,0) arc (0:60:0.28)
  node[black,anchor=south west,inner sep=0.3ex,
  pos=0.35,text opacity=1]{$\alpha$} -- cycle;

\foreach \t / \ttext in {1, -1, 0.333 / \frac13,
  -0.333 / -\frac13, 0.666 / \frac23} {
  \draw (\t,0.05) -- (\t,-0.05) node[below,fill=white,
      inner sep=0.3ex,text height=2.2ex]{$\ttext$};
  \draw (0.05,\t) -- (-0.05,\t) node[left, fill=white,
      inner sep=0.3ex,text height=2.2ex]{$\ttext$};}
```
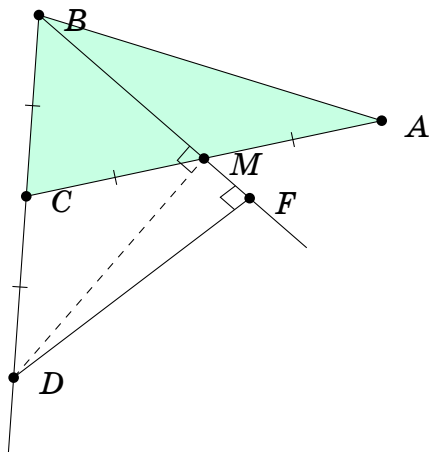
```
\newcommand{\midmark}[2]{\draw ($(#1)!0.5!(#2)!1mm!90:(#2)$)
  -- ($(#1)!0.5!(#2)!1mm!270:(#2)$);}

\newcommand{\perpmark}[3]{
  \coordinate (#1#2) at ($(#2)!2.5mm!(#3)$);
  \draw ($(#2)!2.5mm!(#1)$) -- +($(#1#2)-(#2)$) -- (#1#2);}

\coordinate (C) at (0,0); \coordinate (A) at (4.7,1);
\coordinate (B) at ($(C) ! 0.5 ! 74:(A)$);
\coordinate (M) at ($(C) ! 0.5 ! (A)$);
\coordinate (D) at ($(C) ! -1 ! (B)$);
\coordinate (F) at ($(M) ! -0.8cm ! (B)$);

\filldraw[fill=SpringGreen!22]  (C)--(A)--(B)--cycle;
\draw (C) -- ($(D)!-1cm!(C)$)    (B) -- ($(F)!-1cm!(B)$);
\draw[dashed] (D) -- ($(M)!(D)!(B)$);    \draw (D)--(F);
\midmark{M}{A} \midmark{M}{C} \midmark{C}{B} \midmark{C}{D}
\perpmark{D}{M}{B} \perpmark{D}{F}{B}

\foreach \lbl in {A,B,C,D,M,F} {
  \fill (\lbl) circle[radius=0.7mm]
      ++(-20:2mm) node[right]{\(\lbl\)};}
```
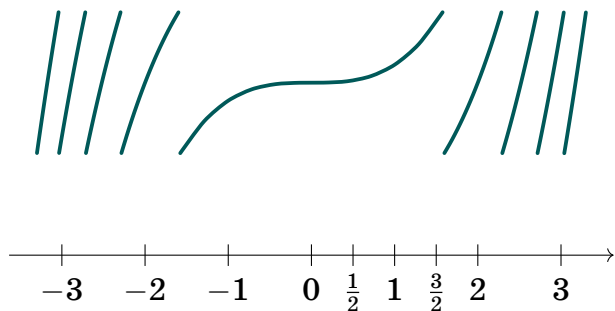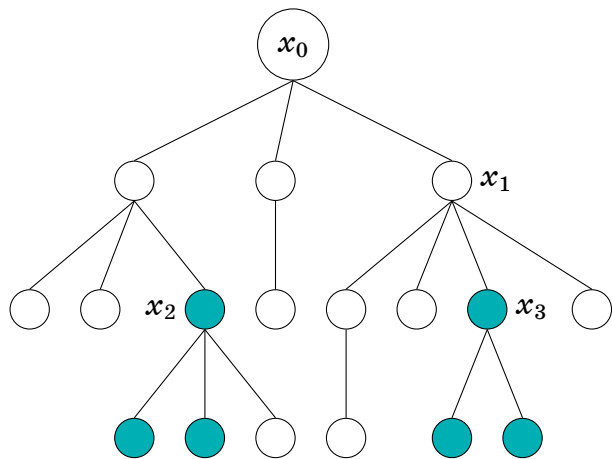
```
\begin{tikzpicture}[xscale=1.1,yscale=1.9,
    declare function={
        sdrob(\x) = Mod(\x+0.5, 1) - 0.5;
        main(\x) = (0.5 * \x)^3;
        invmain(\x) = \x^(1/3) * 2;}]

  \draw[->] ({invmain(-6)}, -1.2)
        -- ({invmain(6)}, -1.2);

  \foreach \x / \xtext in {0 / 0, -1 / -1,
    0.5 / \frac{1}{2}, 1.5 / \frac{3}{2},
    1 / 1, 2 / 2, 3 / 3, -2 / -2, -3 / -3}
    {\draw (\x cm,-11.25 mm) -- (\x cm,-12.75 mm)
        node[below, text height=1.6ex]{$\xtext$};}

  \foreach \t in {-4,...,4} {
    \draw[domain=invmain(\t-0.49):invmain(\t+0.49),
        variable=\x, samples=12, Cyan!35!black,
        line cap=round, line width=0.5mm,
        smooth] plot({\x}, {sdrob(main(\x))});
  }
\end{tikzpicture}
```
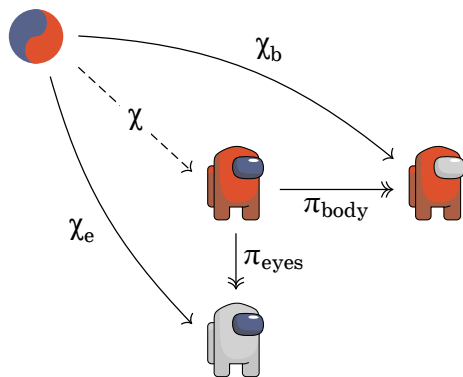
A Tree:


```
\newcommand{\tblue}{fill=TealBlue}

\begin{forest} for tree={circle,draw,l=1.7cm,%
  s sep=4mm,minimum size=2.7ex,inner sep=0.5ex}
    [$x_0$,alias=ROOT
      [
        [ ,before drawing tree={x-=0.45cm}]
        [ ,before drawing tree={x-=0.45cm}]
        [ ,\tblue,alias=X2
          [ ,\tblue]    [ ,\tblue]    [ ]]
      ]   [ [ ]]
      [ ,alias=X1
        [ [ ]]    [ ]
        [ ,\tblue,alias=X3
          [ ,\tblue]    [ ,\tblue]]
        [ ,before drawing tree={x+=0.45cm}]
      ]
    ]
  \node[left=-0.05cm of X2]{$x_2$};
  \node[right=-0.05cm of X3]{$x_3$};
  \node[right=-0.05cm of X1]{$x_1$};
  \node[above=0.5cm of ROOT]{A Tree:};
\end{forest}
```

```
\colorlet{Body}{RedOrange!70!BrickRed}
\colorlet{Eyes}{Cerulean!45!Indigo!55!Navy}
\tikzcdset{every label/.append style = {font=\normalsize}}

\begin{tikzcd}[column sep=large]    \tikz{
  \fill[Eyes] (0,0.36) arc(90:270:0.36);
  \fill[Body] (0,0.36) arc(90:-90:0.36);
  \fill[Eyes,xscale=0.8] (0, 0.18) circle [radius=0.18];
  \fill[Body,xscale=0.8] (0,-0.18) circle [radius=0.18];
}    \ar[dr,  "\chi" description,  dashed]
     \ar[ddr, "\chi_\text{e}"', bend right=14]
     \ar[drr, "\chi_\text{b}",  bend left=18,
         start anchor={[yshift=-0.1cm]east},
         end anchor={[yshift=0.7cm]west}]  \\

  & \tikz{\amongUsI[scale=0.17]{Body}{Eyes}}
    \ar[d, "\pi_\text{eyes}",  two heads]
    \ar[r, "\pi_\text{body}"', two heads, shift left=2.75]
  & \tikz{\amongUsI[scale=0.17]{Body}{gray!35}}  \\

  & \tikz{\amongUsI[scale=0.17]{gray!35}{Eyes}}
\end{tikzcd}
```