

Plot functions with TikZ

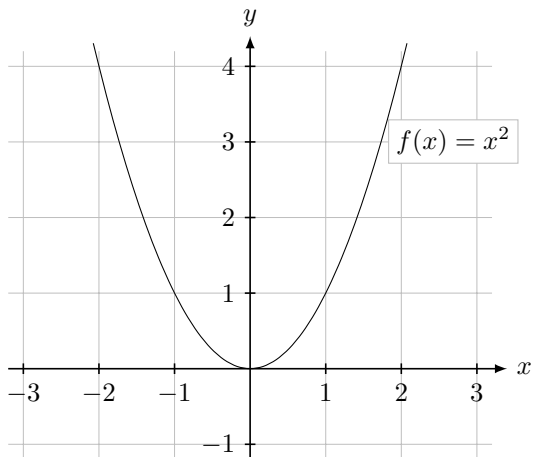
Hauke Stieler ¹

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1 Pure TikZ

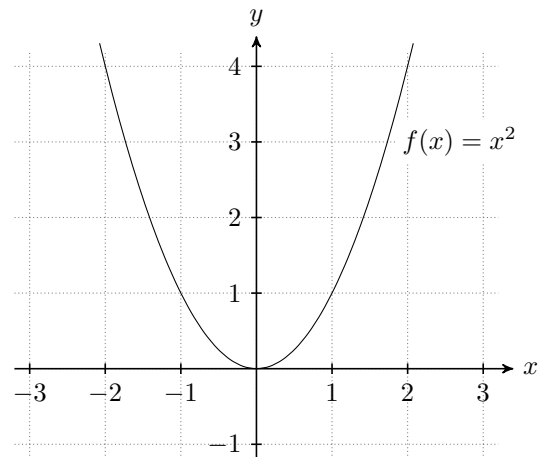
Example 1:

- latex Arrow head
- solid Grid lines
- draw=lightgray Box around function term

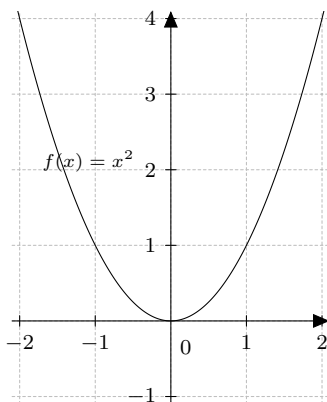


Example 2:

- stealth' Arrow head
- densely dotted Grid lines
- No box around function term



2 TikZ by GeoGebra



- triangle 45 as arrow head
- Imprecise positioning and no background of the labels
- No axis labels
- dash pattern=on drawing style for the grid

¹If you have questions or suggestions, please send a mail to mail@hauke-stieler.de

3 Code of the functions

For example 1:

With comments:

```
\begin{tikzpicture}[>=latex,semithick]
  % Draw the grid as thin gray lines:
  \draw[very thin,color=lightgray] (-3.2,-1.2) grid (3.2,4.2);

  % Axis with arrow head (using the option [->], because [-] will draw lines and
  [>] used for an arrow head)
  % (-3.2,0) -- (3.2,0) - are the start and end coordinates
  % node[right] - position of label (right, left, below, over)
  \draw[->] (-3.2,0) -- (3.4,0) node[right] {$x$};
  \draw[->] (0,-1.2) -- (0,4.4) node[above] {$y$};

  % \foreach - a normal foreach loop
  % \x/\xtext - for all x (x is specified after this), write a text
  % in - keyword
  % {-2/-2,...} - the amount of x we use here, also specifies what should be written
  % e.g.: -2/hauke writes "hauke" on the x-axis at -2
  \foreach \x/\xtext in {-3/-3, -2/-2, -1/-1, 1/1, 2/2, 3/3}

  % finally draws the text
  % shift{[x,y]} - is like an offset vector. Here is should shift it by [x,0], meaning
  along the x axis
  % (0pt,2pt) -- (0pt,-2pt) - specifies the axis line. (start-point) -- (end-point).
  The "--" option says that this is a line
  % node[below] - sets the text below the axis
  % {$\xtext$} - writes the value of \xtext, which is like a string variable. You
  can change the name (don't forget to change it in the loop as well).
  \draw[shift={(\x,0)}] (0pt,2pt) -- (0pt,-2pt) node[below] {$\xtext$};

  % same as above, this time with y
  \foreach \y/\ytext in {-1/-1, 1/1, 2/2, 3/3, 4/4}
  \draw[shift={(0,\y)}] (2pt,0pt) -- (-2pt,0pt) node[left] {$\ytext$};

  % Here comes the actual graph plotting
  % domain=-2:2 - specifies the x area (from -2 to 2)
  % smooth - smooth drawing
  % variable=\x - declares the variable x
  % blue - sets the color
  % plot ({\x},{\x*\x}) - acts like f(x)=x*x. First parameter is the variable of
  the function, second the function itself
  \draw[thin,domain=-2.075:2.075,smooth,variable=\x,black] plot ({\x},{\x*\x}) node[inner
  sep=1mm,below=1.3cm,right=-0.25cm,fill=white,draw=lightgray] {$f(x)=x^2$};
\end{tikzpicture}
```

Without comments:

```
\begin{tikzpicture}[>=latex,semithick]
  \draw[very thin,color=lightgray] (-3.2,-1.2) grid (3.2,4.2);

  \draw[->] (-3.2,0) -- (3.4,0) node[right] {$x$};
  \draw[->] (0,-1.2) -- (0,4.4) node[above] {$y$};

  \foreach \x/\xtext in {-3/-3, -2/-2, -1/-1, 1/1, 2/2, 3/3}
  \draw[shift={(\x,0)}] (0pt,2pt) -- (0pt,-2pt) node[below] {$\xtext$};

  \foreach \y/\ytext in {-1/-1, 1/1, 2/2, 3/3, 4/4}
  \draw[shift={(0,\y)}] (2pt,0pt) -- (-2pt,0pt) node[left] {$\ytext$};

  \draw[thin,domain=-2.075:2.075,smooth,variable=\x,black] plot ({\x},{\x*\x}) node[inner
sep=1mm,below=1.3cm,right=-0.25cm,fill=white,draw=lightgray] {$f(x)=x^2$};
\end{tikzpicture}
```

For example 2:

```
\begin{tikzpicture}[>=stealth',semithick]
  \draw[thin,densely dotted,color=gray] (-3.2,-1.2) grid (3.2,4.2);

  \draw[->] (-3.2,0) -- (3.4,0) node[right] {$x$};
  \draw[->] (0,-1.2) -- (0,4.4) node[above] {$y$};

  \foreach \x/\xtext in {-3/-3, -2/-2, -1/-1, 1/1, 2/2, 3/3}
  \draw[shift={(\x,0)}] (0pt,2pt) -- (0pt,-2pt) node[below] {$\xtext$};

  \foreach \y/\ytext in {-1/-1, 1/1, 2/2, 3/3, 4/4}
  \draw[shift={(0,\y)}] (2pt,0pt) -- (-2pt,0pt) node[left] {$\ytext$};

  \draw[thin,domain=-2.075:2.075,smooth,variable=\x,black] plot ({\x},{\x*\x}) node[inner
sep=1mm,below=1.3cm,right=-0.25cm,fill=white] {$f(x)=x^2$};
\end{tikzpicture}
```

From the GeoGebra graph:

```
\definecolor{cqcqcq}{rgb}{0.75,0.75,0.75}
\begin{tikzpicture}[line cap=round,line join=round,>=triangle 45,x=1.0cm,y=1.0cm]
\draw [color=cqcqcq,dash pattern=on 1pt off 1pt, xstep=1.0cm,ystep=1.0cm] (-2.1,-1.1)
grid (2.1,4.1);
\draw[->,color=black] (-2.1,0) -- (2.1,0);
\foreach \x in {-2,-1,1,2}
\draw[shift={(\x,0)},color=black] (0pt,2pt) -- (0pt,-2pt) node[below] {\footnotesize
$\x$};
\draw[->,color=black] (0,-1.1) -- (0,4.1);
\foreach \y in {-1,1,2,3,4}
\draw[shift={(0,\y)},color=black] (2pt,0pt) -- (-2pt,0pt) node[left] {\footnotesize
$\y$};
\draw[color=black] (0pt,-10pt) node[right] {\footnotesize $0$};
\clip(-2.1,-1.1) rectangle (2.1,4.1);
\draw[smooth,samples=100,domain=-2.1:2.1] plot(\x,{(\x)^2});
\begin{scriptsize}
\draw[color=black] (-1.09,2.11) node {$f(x) = x^2$};
\end{scriptsize}
\end{tikzpicture}
```