

Plotting Bessel functions

This simple example uses Maple to produce a plot of the first six Bessel functions. Two plots are shown, one created by Maple and a second created by LaTeX using the plotting package `pgfplots` and the data exported from Maple.

```
with(plottools):

myPlot := plot([seq(BesselJ(i, z), i = 0 .. 5)], z = 0 .. 15):

exportplot("example-04-fig.jpeg",myPlot,"JPEG"):  # Maple18

a,b,n := 0.0,15.0,150:          # domain and number of samples
dx := (b-a)/n:                  # uniform step

fd := fopen ("example-04.txt", WRITE):
for i from 0 to n by 1 do
  x := a + dx*i:
  fprintf(fd,"% .10e % .10e % .10e % .10e % .10e % .10e % .10e\n",x,
          seq(evalf(BesselJ(k,x)),k=0..5)):
end do:
fclose(fd):
```

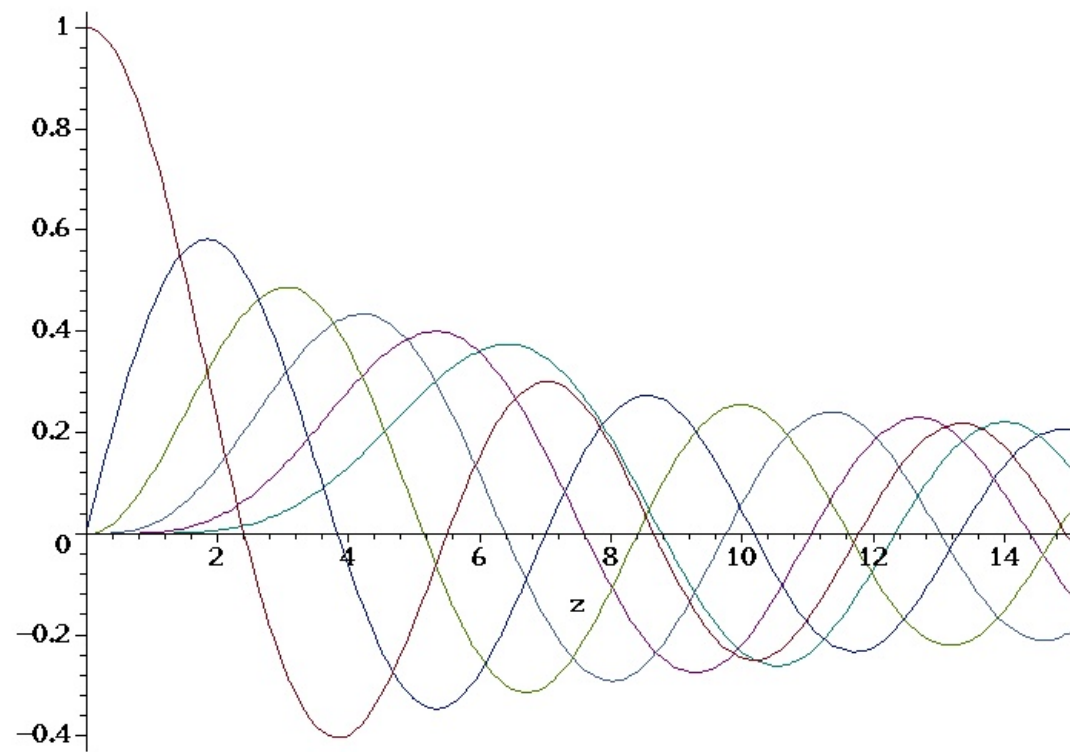


Figure 1: The first six Bessel functions.

Using pgfplots

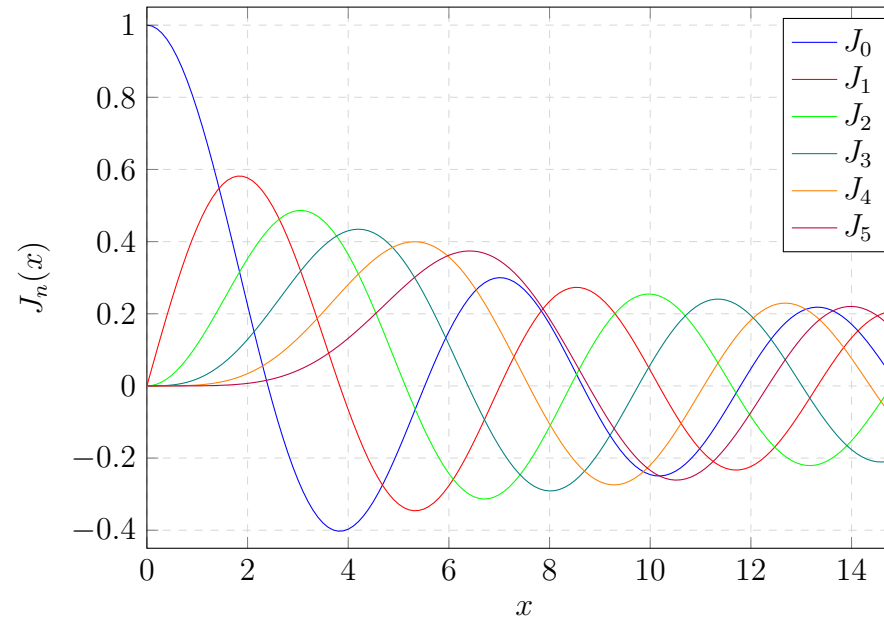


Figure 2: The first six Bessel functions.

```

\begin{tikzpicture} % requires \usepackage{pgfplots}
  \begin{axis}
    [xmin= 0.0, xmax=15.0,
    ymin=-0.45, ymax=1.05,
    xlabel=$x$, ylabel=$J_n(x)$,
    grid=major, grid style={dashed,gray!30},
    legend entries = {$J_0$, $J_1$, $J_2$, $J_3$, $J_4$, $J_5$}]
    \addplot[blue] table [x index=0, y index=1]{example-04.txt};
    \addplot[red] table [x index=0, y index=2]{example-04.txt};
    \addplot[green] table [x index=0, y index=3]{example-04.txt};
    \addplot[teal] table [x index=0, y index=4]{example-04.txt};
    \addplot[orange] table [x index=0, y index=5]{example-04.txt};
    \addplot[purple] table [x index=0, y index=6]{example-04.txt};
  \end{axis}
\end{tikzpicture}
\captionof{figure}{The first six Bessel functions.} % requires \usepackage{caption}

```