LuaTeX

Eureka

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1 LuaTeX Primitive

```
% run TeX command in Lua
\newcommand{\texcmd}{some text}
\directlua{
  local var = "\texcmd"
  tex.print(var)
}
```

some text

2 Luacode package

2.1 baisc uasge

```
\begin{luacode}
  tex.sprint(math.random())
\end{luacode}
```

0.20413700863719

```
\begin{luacode*}
  tex.print("\\begin{tabular}{|l|l|l|}")
  tex.print("\\hline ")
  tex.print("1 & a & Test A \\\\")
  tex.print("2 & b & Test B \\\\")
  tex.print("\\hline ")
  tex.print("\\end{tabular}")
\end{luacode*}
```

1	a	Test A
2	b	Test B

2.2 define function

using luacode* because there are percentage signs

```
% declare the sqrt function in Lua
\begin{luacode*}
  function compute_sqrt(v)
    local s = math.sqrt(tonumber(v))
    local s_f = math.floor(s)
    local o
    if (math.abs(s_f * s_f - v) < 1.0e-5) then
        o = string.format("%.1f", s)
    else
        o = string.format("%.6f", s)
    end
    tex.print(o)
  end
\end{luacode*}

% declare a wrapper in TeX
\newcommand{\luasqrt}[1]{\directlua{compute_sqrt(#
1)}}
\luasqrt{2}
```

1.414214

3 LuaTEX for Plot

Consider function $f(x) = (\pi - x)/2$ in the interval $(0, 2\pi)$.

```
\begin{luacode*}
-- Fourier series
function partial_sum(n,x)
  partial = 0;
  for k = 1, n, 1 do
    partial = partial + math.sin(k*x)/k
  end;
  return partial
end

-- Code to write PGFplots data as coordinates
function
print_partial_sum(n,xMin,xMax,npoints,option)
  local delta = (xMax-xMin)/(npoints-1)
  local x = xMin
  if option~=[[]] then
    tex.sprint("\\addplot["..option..."]
    coordinates{")
  else
    tex.sprint("\\addplot coordinates{")
  end
  for i=1, npoints do
    y = partial_sum(n,x)
    tex.sprint("("..x..","..y..")")
    x = x+delta
  end
  tex.sprint("}")
end
\end{luacode*}

\newcommand\addLUADEDplot[5][]{%
  \directlua{print_partial_sum(#2,#3,#4,#5,[[#1]])
  }%
}


\pgfplotsset{width=15cm, height=7cm}
\begin{tikzpicture}[scale=.5]
\begin{axis}[xmin=-0.2, xmax=31.6, ymin=-1.85,
ymax=1.85,
    xtick={0,5,10,15,20,25,30},
    ytick={-1.5,-1.0,-0.5,0.5,1.0,1.5},
    minor x tick num=4,
    minor y tick num=4,
    axis lines=middle,
    axis line style={-}
  ]
  % SYNTAX: Partial sum 30, from x = 0 to 10*pi,
  sampled in 1000 points
  \addLUADEDplot[color=blue,smooth]{30}{0}{10*math
  .pi}{1000};
\end{axis}
\end{tikzpicture}
```