

sum_demo_pieewise_python

August 31, 2025

1 Sum Demo of Piecewise Function Plotting in Python

```
[1]: from numpy import *
from matplotlib.pyplot import *
import sk_dsp_comm.sigsys as ss
import fxpmath as fxp
import sk_dsp_comm.fir_design_helper as fir_d
import scipy.signal as signal
from IPython.display import Audio, display
from IPython.display import Image, SVG

%config InlineBackend.figure_formats=['svg'] # SVG inline viewing
#%config InlineBackend.figure_formats=['pdf'] # render pdf figs for LaTeX
```

2 Following the Plotting Demo in wxMaxima found in sum_demo.wmx

The function we are plotting takes the form

$$p_{\text{tot}}[n] = \begin{cases} n/5, & 0 \leq n \leq 5 \\ 2 - (n/5)^2, & 5 < n \leq 10 \\ 0, & \text{otherwise} \end{cases}$$

```
[10]: def p_total(n):
    """
    A two active intervals solution to the p_tot example problem
    p_tot = p_total(n) where n is assumed to a 1D ndarray index values used for
    ↪plotting

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    """
    # Create an array of zeros to hold the output values
    p_tot = zeros(len(n))
    # step through the index values and apply the piecewise function to the nk
    ↪value
    for k, nk in enumerate(n):
        if nk >= 0 and nk <= 5:
```

```

    p_tot[k] = nk/5
elif nk > 5 and nk <= 10:
    p_tot[k] = 2 - (nk/5)**2
else:
    p_tot[k] = 0 # not really needed as array is zero initialized
return p_tot

```

```

[13]: n = arange(-2,12+1)
p_tot = p_total(n)
stem(n,p_tot)
print('p_tot[n] = ',p_tot)
title(r'Piecewise Function $p_{\text{tot}}[n]$')
xlabel(r'Index $n$')
ylabel(r'Amplitude')
grid();

```

```

p_tot[n] = [ 0.    0.    0.    0.2  0.4  0.6  0.8  1.    0.56 0.04 -0.56
-1.24
-2.    0.    0. ]

```

