Solution for Problem DN

Source Filename: /solution.py

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""""Solution to Chapter 3 problem DN"""  
import numpy as np  
import matplotlib.pyplot as plt

# Introduction

This program defines several mathematical functions as vectorized functions that can handle NumPy array inputs and plots them over the given domain using Matplotlib.

# Define Mathematical Functions

Define :

def f(x: np.ndarray) -> np.ndarray:  
 return np.tanh(4 \* np.sin(x))

Define :

def g(x: np.ndarray) -> np.ndarray:  
 return np.sin(np.sqrt(x))

Define :

def h(x: np.ndarray) -> np.ndarray:  
 return np.where(x >= 0, np.exp(-x) \* np.sin(2 \* np.pi \* x), 0)

# Plotting

Define a plotting function:

def plotter(fig, fun, limits, labels):  
 x = np.linspace(limits[0], limits[1], 201)  
 fig.gca().plot(x, fun(x))  
 fig.gca().set\_xlabel(labels[0])  
 fig.gca().set\_ylabel(labels[1])  
 return fig

Plot :

fig, ax = plt.subplots()  
plotter(fig, fun=f, limits=(-5, 8), labels=("$x$", "$f(x)$"))

<IPython.core.display.Markdown object>

Plot :

fig, ax = plt.subplots()  
plotter(fig, fun=g, limits=(0, 100), labels=("$x$", "$g(x)$"))

<IPython.core.display.Markdown object>

Plot :

fig, ax = plt.subplots()  
plotter(fig, fun=h, limits=(-2, 6), labels=("$x$", "$h(x)$"))

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plt.show()





