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# CECS 100 Project 3
# "Graphing a line using matplotlib and pyplot"
# Start date: 06 November 2018
# End date: 08 November 2018
# Name: Rodrigo Becerril Ferreyra
# ID: 017584071

'''
This program is intended to graph the line defined either by two points
or by a slope and a y-intercept. The required parameters will be inputted
by the user.
'''

# pyplot is the necessary library for this program
import matplotlib.pyplot as plt

# plot a line using two user-defined points
def twopoints():
    print("\nEnter the coordinates of your two points as prompted.")
    while True:
        try:
            # User input
            x1 = float(input("X1 = "))
            y1 = float(input("Y1 = "))
            x2 = float(input("X2 = "))
            y2 = float(input("Y2 = "))
            # If the user does not input a valid number, make him
            # start all over again
            # If the user does input a valid number, proceed with
            # the program
            error = False
            break
        except ValueError:
            error = True
            print("You didn't enter an integer. Please try again.")

    # if no error occurred during user input
    if(not error):
        # calculate slope
        m = (y2 - y1)/(x2 - x1)

        #  $y = m(x - x_1) + y_1$ 

        # Plot these points
        x = [-10, 0, 10, x1, x2]
        y = []

        for i in x:
            # this calculates f(x) for x = 10, -10, 0, and the x
            # values that the user inputted
            y.append( (m * (i - x1) ) + y1 )

        # plot all points on a line (no visible dots)
        plt.plot(x, y, "r")

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        # if the user inputted something greater than 10 or less than
-10 for any x value
        if(x1 > 10) or (x2 > 10) or (x1 < -10) or (x2 < -10):
            # don't graph x = 10 and x = -10
            plt.plot([x[3], x[4]], [y[3], y[4]], "ro")
        else:
            # graph x = 10 and x = -10
            plt.plot([x[0], x[2], x[3], x[4]], [y[0], y[2], y[3],
y[4]], "ro")
            plt.grid()
            plt.show()

# plot a line using a user-defined slope and y-intercept
def slopeint():
    print("\nEnter the slope and y-intercept of your function as
prompted.")

    while True:
        try:
            # user input
            m = float(input("m = "))
            b = float(input("y = "))
            # if anything goes wrong, the user must try again
            # if not, proceed with the program
            error = False
            break
        except ValueError:
            error = True
            print("You didn't enter an integer. Please try again.")

    if(not error):
        # plot these x values
        x = [-10, 0, 10]
        # calculate y values dependant on x values
        y = [m*x[0]+b, b, m*x[2]+b]
        #for i in x:
        #    y.append(b + (m * i))

        # plot the graph
        plt.plot(x, y, "ro")
        plt.plot(x, y, "r")
        plt.grid()
        plt.show()

def main():
    print("Plot a graph using pyplot!")
    print("\nEnter a 1 or a 2\n1: Plot a line using two points\n2: Plot
a line using a slope and a y-intercept.")

    # menu for user selection
    try:
        ui = int(input("\n"))

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        if ui == 1:
            twopoints()
        elif ui == 2:
            slopeint()
        else:
            raise(ValueError)

    except ValueError:
        print("Please enter a 1 or a 2!")

main()
```