Homework Assignment #1

HW1 is due Sep 13th at 7pm.

Please save your file as 'lastname_firstname_HW1_SYST230.ipynb' and submit on blackboard

Also submit 'lastname_firstname_HW1_SYST230.pdf'

The PDF will be graded and the ipynb file will be used for clarification

include each coded answer in one cell

In [ ]:

```
# 1 A year in the modern Gregorian Calendar consists of 365 days.
# In reality, the earth takes longer to rotate around the sun.
# To account for the difference in time, every 4 years, a leap year takes place.
# A leap year is when a year has 366 days: An extra day, February 29th.
# The requirements for a given year to be a leap year are: The year must be divi

# Write a program that takes in a year as input and determines whether that year

# Your output should appear as follows: The year xxxx is (or is not) a leap year
```

In [ ]:

```
# I have previously solved this problem via hackerrank.com so there are a few ad
#some years such as
# The year can be evenly divided by 4, is a leap year, unless:
# The year can be evenly divided by 100, it is NOT a leap year, unless:
# The year is also evenly divisible by 400. Then it is a leap year.

#create a function that can determine if the year is leap = true or not = False

def panda():
    print('''$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$**$$$$$$$$$**$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$"   ^$$$$$$F    *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$     z$$$$$$L    ^$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$    e$$$$$$$$$e  J$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$eee$$$$$$$$$$$$$e$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$b$$$$$$$$$$$$$$$$$$*$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$)$$$$P"e^$$$F$r*$$$$F"$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$d$$$$  "z$$$$"  $$$$%  $3$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$*"""*$$$  .$$$$$$ z$$$*   ^$e*$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$"     *$$ee$$$$$$$$$$*"     $$$C$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$.      "***$$"*"$$""        $$$$e*$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$b          "$b.$$"          $$$$$b"$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$c.         """            $$$$$$$^$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$e..                     $$$$$$$$^$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$eeee..            J$$$$$$$$b"$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$r          z$$$$$$$$$$r$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$"         z$$$$$**$$$$$^$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$*"          z$$$P"   ^*$$$ $$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$*"           .d$$$$       $$$ $$$$$$$$$$$$$$$$$$$$$
```

```
$$$$$$$$$$$$$$$$$$$$$$$"           .e$$$$$F       3$$ $$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$.         .d$$$$$$$         $PJ$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$eeeeeeed$*""""**""         $\$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$                  $d$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$.                 $$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$e.              d$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$eeeeeee$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$Gilo94'$$$$''')
    return

#algorithm to determine if the year is a leap year
def is_leap(year):
    #assume false
    leap = False
    #check the calculations to ensure it is infact a leap year starting with
    #the most conditions
    if year % 4 == 0 and year % 100 == 0 and year % 400 == 0:
        leap = True
    #if it fails the above conditions but meets these then it is not a leap year
    elif year % 4 == 0 and year % 100 == 0:
        leap = False
    #if it fails the above conditions and passes this then it is a leap year
    elif year % 4 == 0:
        leap = True
    return leap

def main():
    #Take the user year
    user_input = input('Please enter a year: ')
    #Ensure the user actually types a year and not other stuff
    while True:
        # end stop the loopty loops
        if user_input == 'end':
            return
        else:
            try:
                #Attempt the conversion to an int
                user_input = int(user_input)
                leap_year = is_leap(user_input)
                #create a string variable for the year
                year = str(user_input)
                if leap_year == True:
                    print("The year "+ year+" is a leap year" )
                elif leap_year == False:
                    print("The year "+ year+" is not a leap year" )
                return main()
            except:
                #the attempt failed to convert for some reason
                print("Error -> Please type a valid year!")
                return main()
#call the function
panda()
main()
```

```
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$**$$$$$$$$$**$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$"   ^$$$$$$F    *$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$     z$$$$$$L    ^$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$    e$$$$$$$$$e  J$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
```

```
$$$$$$$$$$$$$$$$$$$$$eee$$$$$$$$$$$$$e$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$b$$$$$$$$$$$$$$$$$$*$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$)$$$$P"e^$$$F$r*$$$$F"$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$d$$$$  "z$$$$"  $$$$%  $3$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$*"""*$$$  .$$$$$$ z$$$*   ^$e*$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$"     *$$ee$$$$$$$$$$*"     $$$C$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$.      "***$$"*"$$""        $$$$e*$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$b          "$b.$$"          $$$$$b"$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$c.         """            $$$$$$$^$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$e..                     $$$$$$$$^$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$eeee..            J$$$$$$$$b"$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$r          z$$$$$$$$$$r$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$"         z$$$$$**$$$$$^$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$*"          z$$$P"   ^*$$$ $$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$*"           .d$$$$       $$$ $$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$"           .e$$$$$F       3$$ $$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$.         .d$$$$$$$         $PJ$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$eeeeeeed$*""""**""         $\$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$                  $d$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$.                 $$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$e.              d$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$eeeeeee$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$Gilo94'$$$$
Please enter a year: 1000
The year 1000 is not a leap year
Please enter a year: 1600
The year 1600 is a leap year
Please enter a year: 2002
The year 2002 is not a leap year
Please enter a year: 2021
The year 2021 is not a leap year
Please enter a year: 2222
The year 2222 is not a leap year
Please enter a year: 2021
The year 2021 is not a leap year
Please enter a year: 2002
The year 2002 is not a leap year
Please enter a year: 1998
The year 1998 is not a leap year
Please enter a year: 1900
The year 1900 is not a leap year
```

In [ ]:

```
#2 Write a program that asks a user to input a number and returns the
# lower and uppercase letter of the alphabet that corresponds to the entered let
# Input should ask for a number between 1 - 26
# provide user feedback if the number input is out of the acceptable range ('You
```

In [18]:

```
#A function to take in the input and make sure it fits the boundaries of
#Being a number and
#being between 1-26
def ask_num(num):
    try:
        x = int(num)
        if x > 0 and x <= 26:
            return True
        else:
            print('Your input is out of range')
            return False
    except:
        print("idk.. that.. wasnt a number :/ try again friend")
        return main()
#Main function to put everything together
def main():
    #Take in an input from the user
    x = input("Enter a number 1-26 and ill give the associated letter: ")
    #see if user wants to end
    if x == 'end':
        print('nighty night')
        return
    else:
        #call the earlier function to make sure it meets our reqs
        number = ask_num(x)
        #the user correctly inputed so we may continue the computation
        if number == True:
            #list the alphabet
            letters = 'abcdefghijklmnopqrstuvwxyz'
            #let python convert it to a list because typing is hard
            letters = list(letters)
            #convert our number into a string
            x = int(x)
            #print the secret code
            print(letters[x-1].upper()+letters[x-1])
            return main()
        elif number == False:
            return main()
main()
```

```
Enter a number 1-26 and ill give the associated letter: 1
Aa
Enter a number 1-26 and ill give the associated letter: 2
Bb
Enter a number 1-26 and ill give the associated letter: adf
idk.. that.. wasnt a number :/ try again friend
Enter a number 1-26 and ill give the associated letter: 29
Your input is out of range
Enter a number 1-26 and ill give the associated letter: 00
Your input is out of range
Enter a number 1-26 and ill give the associated letter: 12
Ll
Enter a number 1-26 and ill give the associated letter: end
nighty night
```

In [ ]:

```
# 3 write a program that takes a user's input and determines if the input is a p
# Based on user input return, Yes! Your input is a palindrome or Sorry, your inp
```

In [19]:

```
def main():
    #ask for the word
    word = input("enter a word: ")
    #add a condition to end the program
    if word == '00':
        print('nighty night')
        return
    #compare the word and the same word backwards if the are equal then they mee
    elif word == word[::-1]:
        print("OMG THE WORD " + word.upper() + " IS A PALINDROME")
        return main()
    else:
        print("Sorry this word isn't a palindrome look "+word+" & "+word[::-1]+
        return main()
main()
```

```
enter a word: ran
Sorry this word isn't a palindrome look ran & nar are different
enter a word: nar
Sorry this word isn't a palindrome look nar & ran are different
enter a word: ana
OMG THE WORD ANA IS A PALINDROME
enter a word: asd
Sorry this word isn't a palindrome look asd & dsa are different
enter a word: 00
nighty night
```

In [ ]:

```
# 4 Compose a program to do the following:
# a. First, create a list of random length, the list should contain no less than
# b. Next, fill the list with random values between 1 and 10
# c. Finally, print out the values while removing repeated values that appear co

# For example, if the list contains [1,2,2,1,3,3,3,6,6,4,4,1,2,5,5,5],
# then your program should print 1 2 1 3 6 4 1 2 5 (notice this is not in list f
```

In [23]:

```
import random
#list gotta be more then 10 and less then 20
#Generate a random number
random_number = random.randint(10,20)
#create a string with that length
space = ' '*random_number
#populate the list with the empty strings
fun_list = list(space)

list_len = random_number
counter = -1
for x in fun_list:
    counter += 1
    fun_list[counter] = random.randint(1,10)
#print(random_number)
#print(fun_list)
counter = 0
new_list = []
for number in fun_list:
    counter += 1
    if counter > len(fun_list)-1:
        new_list.append(number)
    elif number != fun_list[counter]:
        new_list.append(number)
print('The original list contains the values: '+str(fun_list))
print('Here is the compacted list:            '+str(new_list))
```

```
The original list contains the values: [5, 2, 2, 6, 9, 4, 10, 8, 2, 5, 1, 1, 1,
7]
Here is the compacted list:            [5, 2, 6, 9, 4, 10, 8, 2, 5, 1, 7]
```

In [110…

```
# 5 Assign the string below to a variable, then split the string and create a se
# Display the unique words in sorted order.

# 'to be or not to be that is the question'

# For problem #5, instead of displaying the words in sorted order in a set,
# please display the words in order (as they appear) with the count that the wor
# As such you will need to use a dictionary instead of a set.
# 'to be or not to be that is the question'
```

In [24]:

```
#sort by the number of occurences

#init the dictionary
word_dict = {}
#save the string to a variable
given_string = 'to be or not to be that is the question'
#split the string
x = given_string.split()
#convert into a list
x = list(x)
#loop through and add key + values
for word in x:
    word_dict[word] = x.count(word)

#the words appear in the original order although there cannot be duplicate keys
print(word_dict)
```

```
{'to': 2, 'be': 2, 'or': 1, 'not': 1, 'that': 1, 'is': 1, 'the': 1, 'question':
1}
```

In [ ]:

```

```