PRE- RELEASE TEMPERATURES PROGRAM

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10.7 4966

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TABLE IDENTIFIER:

Variable name	Data type	Declaration	Description
middayTotal	Real	Declare middayTotal: Real	Variable used to calculate the sum of all the temperatures inputted at midday
midnightTotal	Real	Declare midnightTotal: Real	Variable used to calculate the sum of all the temperatures inputted at midnight
highest_mid_temp	Real	Declare highest_mid_temp: Real	Variable used to find the highest midday temperature from the array named daytemp
lowest_night_temp	Real	Declare lowest_night_temp: Real	Variable used to find the lowest midnight temperature from the array named nighttemp
highday	String	Declare highday: String	Variable used to find the day in which the highest temperature at midday was stored in
lownight	String	Declare lownight: String	Variable used to find the day in which the lowest temperature at midnight was stored in
day_count	Integer	Declare day_count: Integer	Variable used in a for loop to count the number of days the user inputs the temperature value
averageDay	Real	Declare averageDay: Real	Variable used to calculate the average temperature for midday
averageNight	Real	Declare averageNight: Real	Variable used to calculate the average temperature for midnight
daytemp	1D array	Declare daytemp: Array [1:30] of Real	1 dimensional array used to store the values inputted by the user at midday
nighttemp	1D array	Declare nighttemp: Array [1:30] of Real	1 dimensional array used to store the values inputted by the user at midnight
middayTemp	Real	Declare middayTemp: Real	Variable used to allow the user to input a temperature value for midday
midnightTemp	Real	Declare midnightTemp: Real	Variable used to allow the user to input a temperature value for midnight
count	Integer	Declare count: Integer	Variable used to keep count of for loops for midday and midnight temps
day	Integer	Declare day: Integer	Variable used to print the number of days the user inputs the temperature value

PSEUDOCODE:

```
START
// pre-release midday and midnight temperatures

middayTotal← 0
midnightTotal← 0
highest_mid_temp← 0
lowest_night_temp← 99
highday← 0
lownight← 0
day_count← 0
day← 0
count← 0
averageDay← 0
averageNight← 0

// populating my lists
daytemp ←  [ ]
nighttemp ← [ ]

// input and store midday and midnight temperatures

DEF Temperatures()
    FOR count = 1 TO 2
        middayTemp ← INPUT "input midday temp"

        WHILE middayTemp < 0 or middayTemp > 100
            OUTPUT "error data out of range try again"
            middayTemp ← INPUT "input midday temp"
        daytemp.append(middayTemp)

        ENDWHILE
    ENDFOR

    FOR count = 1 TO 2
        midnightTemp ← INPUT "input midnight temp"

        WHILE midnightTemp < 0 or midnightTemp > 100
            OUTPUT "error data out of range try again"
```

```
            midnightTemp ← "input midnight temp"
         nighttemp.append(midnightTemp)

         ENDWHILE
      ENDFOR

FOR day_count = 1 TO 30
    day ← day_count
    OUTPUT "day", day
    Temperatures()

OUTPUT "the elements in the array at midday are", daytemp
OUTPUT "the elements in the array at midnight are", nighttemp

// finding the total and average temperatures
FOR count = 1 TO 30
    middayTotal ← middayTotal+ daytemp[count]
    midnightTotal ← midnightTotal+ nighttemp[count]
    count ← count+1

    averageDay ← middayTotal/count
    averageNight ← midnightTotal/count

ENDFOR

// finding the highest value at midday and the lowest value at
midnight

FOR count = 1 TO 30
    IF daytemp[count] > highest_mid_temp

      THEN
         highest_mid_temp ← daytemp[count]

         count ← count+1
         highday ← count

FOR count = 1 TO 30
    IF nighttemp[count] < lowest_night_temp

     THEN
         lowest_night_temp ← nighttemp[count]
```

```
            count ← count+1
            lownight ← count

        ENDIF
    ENDFOR

    // output of the results
    OUTPUT "the sum of the elements in the array at midday are",
    middayTotal
    OUTPUT "the sum of the elements in the array at midnight are",
    midnightTotal
    OUTPUT "the average of the elements in the array at midday
    is:", averageDay
    OUTPUT "the average of the elements in the array at midnight
    is:", averageNight
    OUTPUT "highest midday value is", highest_mid_temp
    OUTPUT "lowest midnight value is", lowest_night_temp
    OUTPUT "the highest midday value was on day", highday
    OUTPUT "the lowest midnight value was on day", lownight

    END
```

TEST PLAN:

Test type	Test value	Expected outcome	Actual outcome	Description
Normal	15, 25	15, 25		Data which is acceptable within the given range.
Abnormal	“f”, -87	Error message		Data which is unacceptable within the given range.
Extreme	0, 100	0, 100		Data and the end of the given range- acceptable.

ANNOTATED PROGRAM LISTING:

```
#Carole Youssef 10.7 4966
#pre release midday and midnight temperatures
#allowing the user to input midday and midnight temps
#finding the total and average of the temperatures
#finding the highest value at midday
#finding the lowest value at midnight

middayTotal=0
midnightTotal=0
highest_mid_temp=0
lowest_night_temp=99
highday=0
lownight=0
day_count=0
day=0
count=0
averageDay=0
averageNight=0

#populating my lists
daytemp = [ ]
nighttemp = [ ]

def Temperatures():
    for count in range(0,1):

#input and store midday and midnight temperatures

        middayTemp=float(input("input midday temp"))

        while middayTemp <0 or middayTemp >100:
            print("error data out of range try again")
            middayTemp=float(input("input midday temp"))
        daytemp.append(middayTemp)

    for count in range(0,1):

        midnightTemp=float(input("input midnight temp"))

        while midnightTemp <0 or midnightTemp >100:
            print("error data out of range try again")
            midnightTemp=float(input("input midnight temp"))
        nighttemp.append(midnightTemp)
```

```
for day_count in range (1,31):
    day=[day_count]
    print("day",day)
    Temperatures()


print("the elements in the array at midday are",daytemp)
print("the elements in the array at midnight are",nighttemp)


for count in range (0,30):
#finding the total and average temperatures
    middayTotal=middayTotal+daytemp[count]
    midnightTotal=midnightTotal+nighttemp[count]
    count=count+1

    averageDay=(middayTotal/count)
    averageNight=(midnightTotal/count)

#finding the highest value at midday and the lowest value at midnight
for count in range (0,30):
    if daytemp[count]>highest_mid_temp:
         highest_mid_temp=daytemp[count]

         count=count+1
         highday=count

for count in range (0,30):
    if nighttemp[count]<lowest_night_temp:
         lowest_night_temp=nighttemp[count]

         count=count+1
         lownight=count

#output of the results
print("the sum of the elements in the array at midday are",middayTotal)
print("the sum of the elements in the array at midnight are",midnightTotal)
print("the average of the elements in the array at midday is:",averageDay)
print("the average of the elements in the array at midnight is:",averageNight)
print("highest midday value is",highest_mid_temp)
print("lowest midnight value is",lowest_night_temp)
print("the highest midday value was on day",highday)
print("the lowest midnight value was on day",lownight)
```

TEST RESULTS:

Test type	Test value	Expected outcome	Actual outcome	Description
Normal	15, 25	15, 25	15, 25	Data which is acceptable within the given range.
Abnormal	"f", -87	Error message	Error message	Data which is unacceptable within the given range.
Extreme	0, 100	0, 100	0, 100	Data and the end of the given range- acceptable.

```
day [1]
input midday temp15
input midnight temp25
day [2]
input midday temp0
input midnight temp100
day [3]
input midday temp-87
error data out of range try again
input midday tempf
Traceback (most recent call last):
  File "/Users/macbookpro/Desktop/Comp. Science/pre release 2016/pre release
final.py", line 48, in <module>
    Temperatures()
  File "/Users/macbookpro/Desktop/Comp. Science/pre release 2016/pre release
final.py", line 33, in Temperatures
    middayTemp=float(input("input midday temp"))
ValueError: could not convert string to float: 'f'
```

Normal

Extreme

Abnormal

QUESTIONS IN RELATION TO PROGRAM:

1 (a) All variables, constants and other identifiers must have meaningful names.

(i) Describe the data structures that you have used to store the temperatures in Task 1, include the name, data type and use for each data structure.

I first stored the temperatures in the variables middaytemp and midnighttemp. They are both real and are used to allow the user to input temperature values between 0 and 100 at midday/ midnight. I then appended these to daytemp and nighttemp. These are 1D arrays used to store the temperatures from middaytemp and midnighttemp.

(ii) State one constant variable that you have used in Task 1. Give the data type for the variable. State what it is used for.

Constant Variable name Count
Data type Integer
Use Variable used to print the number of days the user inputs the temperature value

(b) Explain how you calculated the highest and lowest temperatures

To calculate the highest and lowest temperatures I first initialized highest_mid_temp to 0 and lowest_night_temp to 99. Then I coded my program to make sure that the highest temperature value for midday was stored in highest_mid_temp. I did the opposite for midnight and made sure it was the lowest value from the temperature.

```
#finding the highest value at midday and the lowest value at midnight
for count in range (0,3):
    if daytemp[count]>highest_mid_temp:
         highest_mid_temp=daytemp[count]

         count=count+1
         highday=count

for count in range (0,3):
    if nighttemp[count]<lowest_night_temp:
         lowest_night_temp=nighttemp[count]

         count=count+1
         lownight=count
```

(c) Write an algorithm for Task 2, using either Pseudocode, programming statements or a flowchart. Assume that Task 1 has been completed.

```
// finding the total and average temperatures
FOR count = 1 TO 30
    middayTotal ← middayTotal+ daytemp[count]
    midnightTotal ← midnightTotal+ nighttemp[count]
    count ← count+1

    averageDay ← middayTotal/count
    averageNight ← midnightTotal/count

ENDFOR

OUTPUT "the average of the elements in the array at midday is:",
averageDay

OUTPUT "the average of the elements in the array at midnight is:",
averageNight
```

(d) Explain how you changed your program for Task 1 to meet the requirements for Task 2. Include and fully explain any altered or additional programing statements to calculate the average temperatures

After all the elements were stored in the array of daytemp and nighttemp, I added up all the values to get a total for midday and midnight. Then to find the average temperatures I divided the total by the number of days in a month which was 30.

```
for count in range (0,3):
#finding the total and average temperatures
    middayTotal=middayTotal+daytemp[count]
    midnightTotal=midnightTotal+nighttemp[count]
    count=count+1

    averageDay=(middayTotal/count)
    averageNight=(midnightTotal/count)
```

(e) State three items of test data you could use in Task 1 to test the input of the input value and explain why you chose them. Your reasons must be different for each item of test data.

Test data 1 Normal e.g. 25
Reason: To test for data which is acceptable within the given range.

Test data 2 Abnormal e.g. 100
Reason: To test for data which is unacceptable within the given range.

Test data 3 Extreme e.g. “f”
Reason: To test for data the end of the given range which is also acceptable.