Faculty Computers and Artificial Intelligence Cairo University

Course: Structured Programming

Assignment: Task 4

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Solved Problems: Problem 1 And Problem 2

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Solved Problems: Problem 3 And Problem 4

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Solved Problems: Problem 5 And Problem 6

Video link for all problems:
https://www.youtube.com/watch?v=GR1_3cPXV7M

Algorithm for problems :

Function checks if mark is valid (number and in range 0 to 100) (m):

```
while True:
    if num is not number:
        Display "Invalid Input! Please enter an integer number between 0 and 100: "
        Take grade again from user
    else:
        convert mark to a floating point number
        if mark < 0 or mark > 100:
            display "Invalid Input! Please enter an integer number between 0 and 100: "
            take grade again from user
        else:
            return mark
```

Function calculates grade (mark):

```
if mark >= 90:
    return "A+"
else if 90 > mark >= 85:
    return "A"
else if 85 > mark >= 80:
    return "B+"
else if  80 > mark >= 75:
    return "B"
else if 75 > mark >= 70:
    return "C+"
else if 70 > mark >= 65:
    return "C"
```

```
    else if 65 > mark >= 60:
        return "D+"
    else if 55 > mark >= 50:
        return "D"
    else if mark < 50:
        return "F"

Function problem1():
    Display "***Welcome to grade calculator***"
    Display "Enter your grade: "
    Take mark from user
    carrryMark = check if mark is valid (mark)
    grade = calculates grade (carrryMark)
    Display "Your Grade Is: ", grade

Function count Digits (n):
    carry = n
    cnt = 0
    while carry > 0:
        divide carry by 10 using floor divison
        add 1 to cnt
    return cnt
Function check the input is a number (p):
    While p is not number :
        Display "Invalid Input! Please enter an integer number: "
         Take p  again from user
    return p as integer number
```

```
Function problem2():
    Display "***Welcome to Armstrong number checker***"
    summation = 0
    Display ("Enter an integer number: ")
    Take input from user and store it  in variable num
    carryNum =  check if input is an integer number (num)
    numI = carryNum
    numOfDigits = count Digits(numI)
    while numI > 0:
        digit = numI % 10
        adding the result of raising digit to the power of numOfDigits to summation
        divide num by 10 using floor divison
    if summation = carryNum:
        Display "Armstrong Number... Sum ="{ summation}, "& Num ="{ carryNum}
    else:
        Display "Not Armstrong Number... Sum ="{ summation} "& Num ="{ carryNum}


Function problem3():
    while True:
        Display "please insert positive integer number: "
        take input from user and store it  in str_n
        if str_n is not a number :
            Display "Please enter a valid number."
        else:
            n = to integer (str_num)
            if n <= 0:
                Display "Please enter a positive number."
```

```
        else:
            end the loop.
    pi = 0
    for i from zero to n
      pi = pi + ((-1) **(i+1))*(1/(2*i-1))
    Display "pi/4 now equal:", pi.
    Display "pi now equal:", 4*pi.

Function problem4():
    Display "enter message you want to Encryption: "
    Take message form user and store it in str.
    For each character i in str:
      If i is not space:
        Display character with ASCII value (ASCII value of i + 1), without newline
      Else:
        Display i, without newline.
    Display newline.

Function lists Are Equal (list1, list2):
    list1_c = copy(list1)
    list2_c = copy(list2)
    If length(list1_c) not equals  length(list2_c):
      return False
    For each item i in list1_c:
      If i in list2_c:
        delete i from list2_c.
      Else:
```

```
        return False
    Return True

Function problem5():
    Display "Enter the elements of the first list separated by spaces: "
    Takes numbers form user and store in list_a
    Display "Enter the elements of the second list separated by spaces: "
    Takes numbers form user and store in list_b.
    If lists Are Equal(list_a, list_b):
        Display "The lists:", list_a, “and” list_b, "are equal."
    Else:
        Display "The lists:", list_a, “and” list_b, "are not equal."

Function get Factors Of Positive Number(number):
   List of factors = []
    For i from one to number:
        If number % i = 0:
            add i to list of factors
    Return list of  factors

Function problem6():
     Display "Enter a positive integer: "
     Take number from user and store it in  positive_integer_s
     positive_integer = check the input is a number (positive_integer_s)
    result = get Factors Of Positive Number(positive_integer)
    Display "The factors of", positive_integer, "are:", result
```

Main Loop:

While True:

Display "Please enter the number of the task you want to solve from [1 : 6] "

Display "anything else program will exit"

Takes choice from user as input and stroe in user_choice

If user_choice = "1":

Call function of problem1()

Else If user_choice = "2":

Call function of problem2()

Else If user_choice = "3":

Call function of problem3()

Else If user_choice = "4":

Call function of problem4()

Else If user_choice = "5":

Call function of problem5()

Else If user_choice = "6":

Call function of problem6()

Else:

End the loop and exist the program