Name, Surname :
Number :
Course Code : SEN114
Course Name : Computer Programming I
Exam : ◌ Midterm ◌ Make-up ● Final
Date :

Please make sure to write your name and student number on each paper that you have used

Question Number	1[20p]	2[30p]	3[10p]	4[1p]	5[40]	6[30p]	**Total**
Mark							

Note:
1-Exam duration is 90 minutes only.2-You dont get any other paper. Please use your paper efficiently!
3-You are not permitted to carry your mobile phone into the exam venue even if it is switched off.

1-[20p]What does the following program ***output? Explain*** *where is* the output comming from? (Only Output even it is correct) or (only explanation even it is correct) or (wrong Explanation with correct output) is zero point!

```
#include<stdio.h>
int pe(int *a,int s);
int main(){
int ar[10]={4,3,6,2,5,23,8,5,1,9};
int *x,k;
x=ar;
k=pe(x,10);
printf("--->%d\n",k);
k=pe(x,5);
printf("--->%d",k);
return 0;}
int pe(int *a,int s){
int m,i;
m=*a;
for(i = 1; i<s; i++){
  if(*(a+i)>m){m= *(a+i);}
}
return m;}
```

2-[30p]Harlan A. Brothers and John A. Knox discovered that as the value of x gets larger, the value of the expression

$$\left(\frac{2x+1}{2x-1}\right)^{x}$$

gets closer and closer to e . Write a program that evaluates this expression for x = 1, 2, 3, and so on until the absolute difference between the expression's value and the real value of "e" is less than 0.000001 . ***Display the value of x*** that causes your loop to exit along with both the final approximation of e and the real value of "e" . Show 6 decimal places.(Real e=2.718281)
[Do not use math.h library. For example, İf you need to calculate power of number, write your own function!]

3-[10p]Write a function that displays a solid square of "*" whose side is specified in integer parameter side.

4-(1p)-Write a program that write your name and surname on the screen!!

5- [40p]A barcode scanner for Universal Product Codes (UPCs) verifies the 12-digit code scanned by comparing the code's last digit (called a check digit) to its own computation of the check digit from the first 11 digits as follows:

I. [step 1]Calculate the sum of the digits in the odd-numbered positions (the first, third, …, eleventh digits) and multiply this sum by 3.

II. [step 2]Calculate the sum of the digits in the even-numbered positions (the second, fourth, …, tenth digits) and add this to the previous result(result of step1).

III. [step 3]If the last digit of the result from step 2 is 0, then 0 is the check digit. Otherwise, subtract the last digit from 10 to calculate the check digit.

IV. [step 4]If the check digit matches the final digit of the 12-digit UPC, the UPC is assumed correct.

1. **Write main function** that prompts the user to enter the 12 digits of a barcode. The program should store the digits in an integer array.
2. **Write a "check" function** to calculate the check digit, and compare it to the final barcode digit. If the digits match, output the barcode with the message **"validated."** If not, output the barcode with the message **"error in barcode."** Also, output with labels the results from steps 1 and 2 of the check-digit calculations. Note that the "first" digit of the barcode will be stored in element 0 of the array. (clue: "check" function takes two argument and it doesnt return any value)

6-[30p] Write a function that determines standart deviation of float array. The function **takes dataset as a float array parameter**!! And it also return result as a float.
(Clue: calculate average first)
Defination:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}\left(x_i - \bar{x}\right)}$$

σ = standard deviation
xi = each value of dataset
$\bar{X}$ **(with a bar over it) =** the arithmetic mean of the data (This symbol will be indicated as **average of dataset**)
N = the total number of data points
(if you **need square root** of some number you can use sqrt function in math.h library. Usage example: **a=sqrt(b);** which means "a" is equal to square root of "b")

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