



Level: 1st year of mathematics
Course: ADS1

Typical solution (math)

Academic year: 2025/2026
Duration: 2h :0m

Exercise 1 : (5 pts)

Consider the following algorithm:

- Correct the four errors present in the code. (1 pts)
- for a=6 x=2 and for a=9 x=3 (1 pts)
- this algorithm computes the integer square root of number (1 pts)
- Rewrite it in C form. (2 pts)

```
scanf("%d",&a);      .5
x=0;                .25
while(x*x<=a)       .5
    x++;            .25
printf("%d", x);    .5
```

1	read(a)
2	x 0
3	while x*x<=a do
4	x ← x+1
5	end while
6	x x-1
	write(x)

Exercise 2 : (5.5 pts)

Write a sum algorithm allowing you to calculate the following sum without using the power operator (^ or pow()):

$$S = \sum_{i=1}^{n-1} \frac{3^i \times X^{2i}}{i!}$$

اكتب الخوارزمية التي تسمح لك بحساب المجموع التالي دون استخدام عامل الطاقة (^ أو pow()):

Algorithm sum

Var s, x, bx: real
i, n, m, b3: integer

begin

write("enter the value of x")

read (x)

write("enter the value of n")

read (n)

b3←1

bx←1

m←1

for i←1 **to** n-1 **do**

 b3←b3*3

 bx←bx*x*x

 m←m*i

 s←s+b3*bx/m

end for

write("s=",s)

end

Exercise 3 : (4.5 pts)

Write a C program that reads a string and determines whether it represents a binary number or not.

Accepted symbols are digits 0–7.



```
#include <stdio.h>
int main() {
    char s[100];
    int isBinary, i;
    printf("Enter a number in octal: ");
    scanf("%s", s);
    i = 0;
    isBinary = 1;
    while (s[i] != '\0' && isBinary == 1) {
        if (s[i] != '0' && s[i] != '1')
            isBinary = 0;
        i++;
    }
    if (isBinary)
        printf("The string represents a Binary number.\n");
    else
        printf("The string is not a Binary number.\n");
    return 0;
}
```

Exercise 4 : (5 pts)

Write a C program that:

- Fills a matrix A(r,c) with integers.
- Then asks the user to enter an integer number x.
- Fills an array T with the numbers from matrix A that are multiples of x.
- Displays the resulting array.

```
#include <stdio.h>
int main() {
    int r, c, x, i, j, k, A[50][50], T[50*50];

    printf("Enter number of rows and number of columns: ");
    scanf("%d%d", &r, &c);
    /* Fill the matrix */
    printf("Enter the elements of the matrix:\n");
    for (i = 0; i < r; i++)
        for (j = 0; j < c; j++)
            scanf("%d", &A[i][j]);
    /* Read x */
    printf("Enter an integer x: ");
    scanf("%d", &x);
    /* Fill array T with multiples of x */
    k = 0;
    for (i = 0; i < r; i++)
        for (j = 0; j < c; j++)
            if (A[i][j] % x == 0) {
                T[k] = A[i][j];
                k++;
            }
    /* Display the resulting array */
    printf("Array T (multiples of %d):\n", x);
    for (i = 0; i < k; i++)
        printf("%d ", T[i]);
    return 0;
}
```

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