Answer of OOP1 Midterm Exam Fall 2016

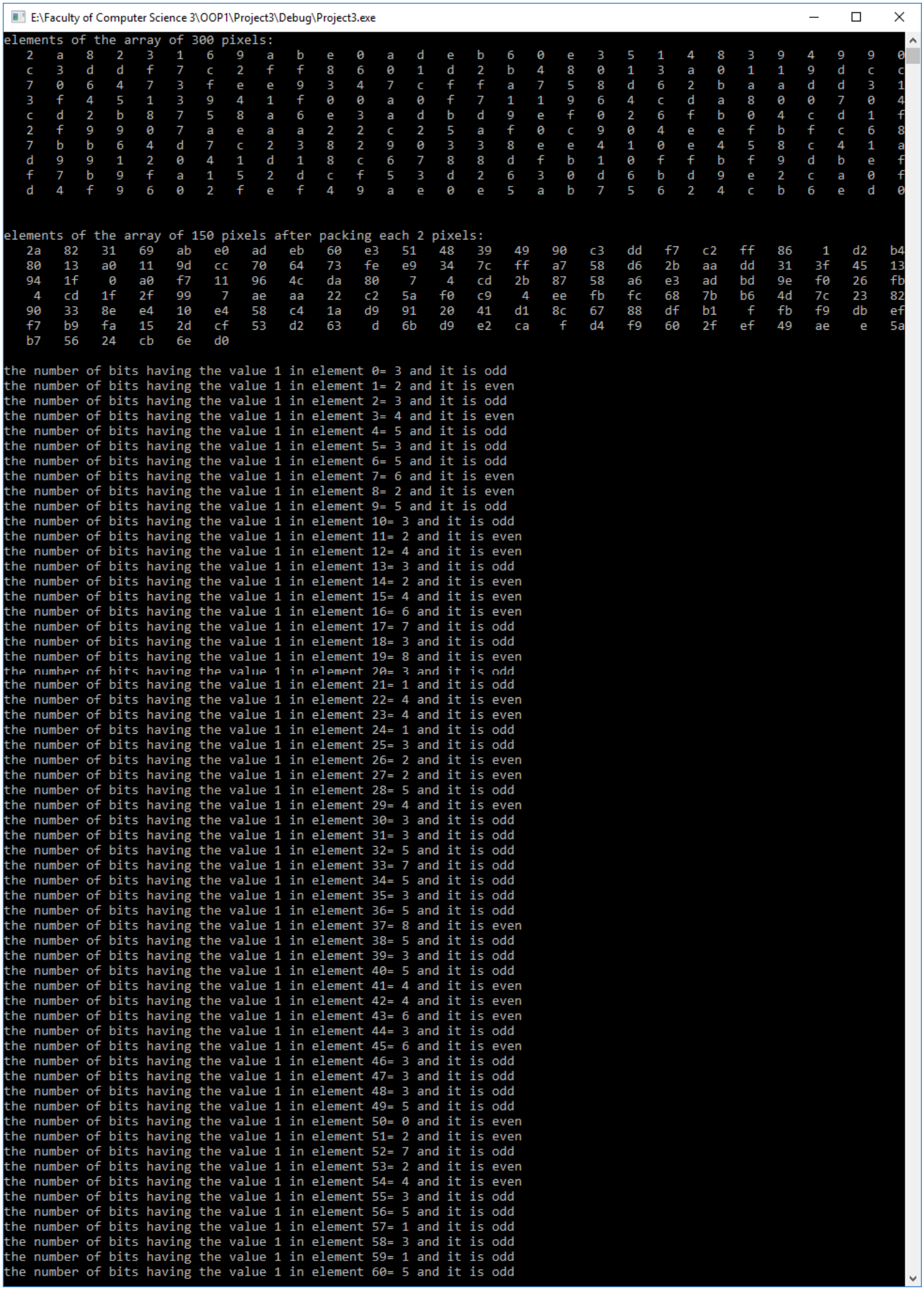
Question 1:

It is required to read the values of 300 bytes, representing pixels of an image segment (each pixel has a value from 0 to 15) and to pack each 2 pixels into one byte of an array of 150 characters. The program then prints the packed array elements in hexadecimal format and determine if the number of bits having value 1 in each element is even or odd.

Answer: Code:

```
#include<iostream>
#include<time.h>
#include<iomanip> //to set width
using namespace std;

void main()
{
	unsigned char pixel1[300], pixel2[150];
	srand(time(NULL));

	for (int i = 0; i < 300; i++)
		pixel1[i]=rand() % 16; //to generate random numbers from 0 to 15
	// note that pixels should be entered by the user

	cout<<"elements of the array of 300 pixels: "<<endl;
	for (int i = 0; i < 300; i++)
		cout<<setw(4)<<hex<<(int)pixel1[i];

	for (int i = 0,j=0; j < 150; i+=2,j++)
	{
		pixel1[i]<<=4;
		pixel2[j]=pixel1[i]|pixel1[i+1];
	}
	cout<<endl<<endl;

	cout<<"elements of the array of 150 pixels after packing each 2 pixels: "<<endl;
	for (int i = 0; i < 150; i++)
		cout<<setw(5)<<hex<<(int)pixel2[i];
	cout<<endl<<endl;

	unsigned char cast,y;
	cast=0x1;

	for (int i = 0; i < 150; i++)
	{
		int count =0;
		while(pixel2[i]!=0)
		{
			y=pixel2[i]&cast;
			if(y==1)
				count++;

			pixel2[i]>>=1;
		}
		if(count%2==0)
			cout<<"the number of bits having the value 1 in element "<<dec<<i<<"=
"<<count<<" and it is even"<<endl;
		else
			cout<<"the number of bits having the value 1 in element "<<dec<<i<<"=
"<<count<<" and it is odd"<<endl;
	}
	system("pause");
}
```

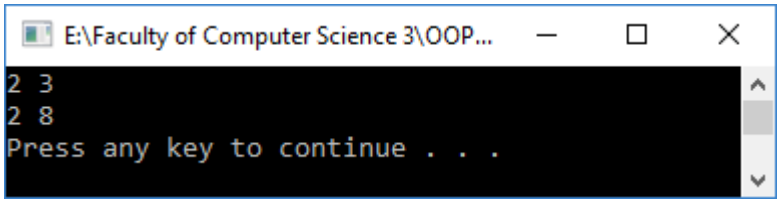
Console: note that the console may differ each time we run the code.



Question 2: What value gets printed by the following C++ program

```
void Myst(int a, int &b){
        a*=b;
        b=2+a;
}
void main(){
        int u=2;
        int v=3;
        cout<<u<<" "<<v<<endl;
        Myst(u,v);
        cout<<u<<" "<<v<<endl;
}
```

Answer:



Question 3:

a) Construct the following classes:
Employee with following member elements:

ID	(of type int)
Name	(of type char)
Phone	(of type char)
Salary	(of type float)

b) Write stack class whose elements are objects of type **Employee** and write the push and pop functions only.
c) Write the main function that use the implemented stack to take the data for a number of **Employees** and insert them into an object of this sack.
d) Show how the stack can be used to print the inserted **Employees in the order** the user inputs them.

Answer:

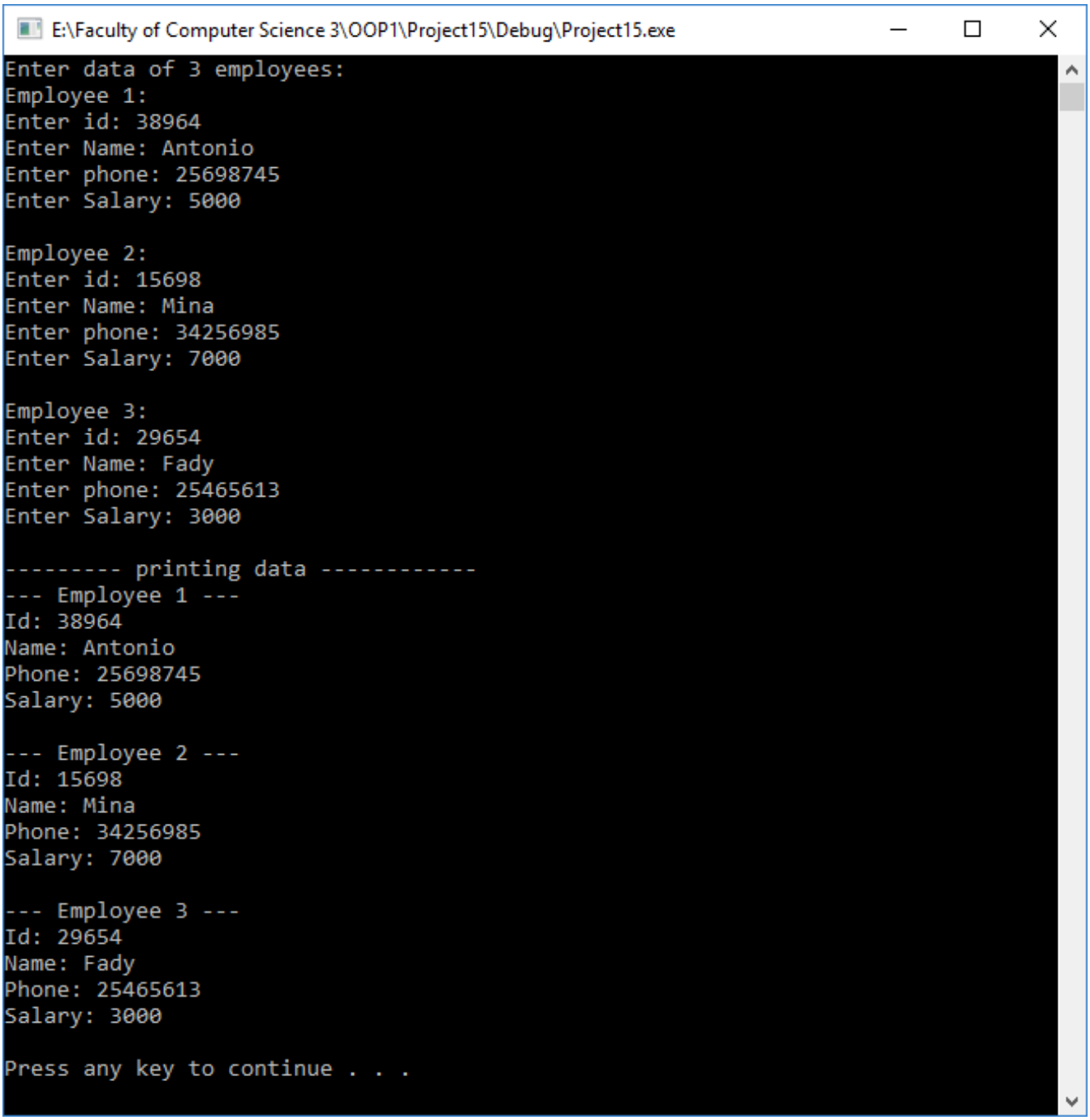
```
#include<iostream>
#include<string>
using namespace std;

struct Employee
{
int id;
char name[40];
char phone [50];
float salary;
};
struct stack
{
	Employee s[10]; //but we will enter 3 employees only
	int top;
};
//we should use the push and pop functions only
void push (stack *stk,Employee e)
{
	stk->top++;
	stk->s[stk->top]=e;
}
Employee pop (stack *stk)
{
	return(stk->s[stk->top--]);
}
void main()
{
	stack s1;
	cout<<"Enter data of 3 employees: "<<endl;
	for (int i = 1; i <= 3; i++)
	{
		Employee e;
		cout<<"Employee "<<i<<": "<<endl;
		cout<<"Enter id: ";
		cin>>e.id;
		cout<<"Enter Name: ";
		cin>>e.name;
		cout<<"Enter phone: ";
		cin>>e.phone;
		cout<<"Enter Salary: ";
		cin>>e.salary;
		cout<<endl;

		push(&s1,e);
	}
	//to print the inserted Employees in the order the user inputs them
	stack s2;
	for (int i = 0; i < 3; i++)
		push(&s2,pop(&s1));

	cout<<"--------- printing data ------------"<<endl;
	for (int i = 1; i <= 3; i++)
	{
		Employee k;
		k=pop(&s2);
		cout<<"--- Employee "<<i<<" ---"<<endl;
		cout<<"Id: "<<k.id<<endl;
		cout<<"Name: "<<k.name<<endl;
		cout<<"Phone: "<<k.phone<<endl;
		cout<<"Salary: "<<k.salary<<endl<<endl;
	}
}
```

a)

b)

c)

d)


E:\Faculty of Computer Science 3\OOP1\Project15\Debug\Project15.exe
Enter data of 3 employees:
Employee 1:
Enter id: 38964
Enter Name: Antonio
Enter phone: 25698745
Enter Salary: 5000
Employee 2:
Enter id: 15698
Enter Name: Mina
Enter phone: 34256985
Enter Salary: 7000
Employee 3:
Enter id: 29654
Enter Name: Fady
Enter phone: 25465613
Enter Salary: 3000
--------- printing data ------------
--- Employee 1 ---
Id: 38964
Name: Antonio
Phone: 25698745
Salary: 5000
--- Employee 2 ---
Id: 15698
Name: Mina
Phone: 34256985
Salary: 7000
--- Employee 3 ---
Id: 29654
Name: Fady
Phone: 25465613
Salary: 3000
Press any key to continue . . .