Name: _____
U#: _____

Exam 1
COP 3514 Program Design

06/03/2013
2:00-3:15 pm

- **Closed books, notes, laptop, phone, neighbors**
- **Good luck!**

1. (a) Write a **.c** program that inputs two integers from the user and prints “Yes” if the first number squared equals the second number, otherwise it prints “No”. **(13 points)**

```
#include <stdio.h>
int main()
{
	int number1,number2;
	int extra;
	char ch;
	while(1)
	{
		printf("Please enter the first number:\n");
		scanf("%d", &number1);
		extra=0;
		while ((ch = getchar()) != '\n') /* flushing the input buffer */
		{
			extra++;
		}

		if(extra!=0)
		{
			printf("Invalid input. You did not enter a number\n");
		}
		else
		{
			break;
		}
	}
	while(1)
	{
		printf("Please enter the second number:\n");
		scanf("%d", &number2);
		extra=0;
		while ((ch = getchar()) != '\n') /* flushing the input buffer */
		{
			extra++;
		}

		if(extra!=0)
		{
			printf("Invalid input. You did not enter a number\n");
		}
		else
		{
			break;
		}
	}
```

```
        if(number1*number1==number2)
        {
                printf("Yes\n");
        }
        else
        {
                printf("No\n");
        }
return 0;
}
```

1. (b) We know that **m** is an integer number. Write a switch statement that prints “Small” if **0<m<5** or “Big” if **5<m<10,** otherwise it prints “Undefined”. **(12 points)**

```
switch(m)
        {
                case 1: case 2: case 3: case 4:
                        printf("Small\n");
                        break;
                case 6: case 7: case 8: case 9:
                        printf("Big\n");
                        break;
                default:
                        printf("Undefined\n");
                        break;
        }
```

2. a) Let A and B be two-dimensional arrays. Write a 2 line code segment that initializes A and B to: **(10 points)**

$$A=\begin{bmatrix} 1 & 2 & 3 & 4 \\ 10 & 20 & 30 & 40 \\ 100 & 200 & 300 & 400 \end{bmatrix} \quad B=\begin{bmatrix} 2 & 3 & 4 & 5 \\ 20 & 30 & 40 & 50 \\ 200 & 300 & 400 & 500 \end{bmatrix}$$

```
int A[3][4]={{1,2,3,4},{10,20,30,40},{100,200,300,400}};
int B[3][4]={{2,3,4,5},{20,30,40,50},{200,300,400,500}};
```

2. b) Write a code segment that prints the matrix C=A+B. Each row element is separated by tab ("\t") and each row is separated by a new line. Example: **(15 points)**

```
3       5       7       9
30      50      70      90
300     500     700     900
```

```
for (i = 0; i < 3; i++)
{
        for (j = 0; j < 4; j++)
        {
                printf("%d \t",A[i][j]+B[i][j]);
        }
        printf("\n");
}
```

3. Complete the definition of the following function: **(25 points)**

```
int ValidatePin(int saved_pin)
{
//The function prompts the user to enter a 4 digit pin
//Anytime the user enters anything else besides a 4 digit number an error message is displayed
//and the user is prompted for a pin again
//When the user enters a 4 digit number and it is the same as saved_pin the function returns 1
//When the user enters a 4 digit number and it is not the same as saved_pin the function returns
//-1
int pin;
int extra;
char ch;
while(1)
{
        printf("Please enter a 4 digit pin number:\n");
        scanf("%d", &pin);
        extra=0;
        while ((ch = getchar()) != '\n') /* flushing the input buffer */
        {
                extra++;
        }

        if((extra!=0)||(pin<1000)||(pin>9999))
        {
                printf("Invalid input\n");
        }
        else
        {
                if(pin==saved_pin)
                {
                        return 1;
                }
                else
                {
                        return -1;
                }
        }
}
}
```

4. Write a code segment that inputs characters from the user until the user enters a 'x' character, then prints the number of characters that have ASCII code with value between 100 and 50 (not including 100 and 50). **(25 points)**

```
char ch;
int count=0;
while((ch=getchar())!='x')
{
        if((ch>50)&&(ch<100))
        {
                count++;
        }
}
printf("%d\n",count);
```

Bonus question:
You will receive partial credit on the bonus question only if it is more than 50% accurate.

Write a program that prompts the user to enter a value N and then allows the user to input N integer numbers. The program then sorts the N numbers and prints them out in descending order. Your program must handle invalid input. **(10 points)**

```
#include <stdio.h>

int ValidateInput()
{
	int number;
	int extra;
	char ch;
	while(1)
	{
		scanf("%d", &number);
		extra=0;
		while ((ch = getchar()) != '\n') /* flushing the input buffer */
		{
			extra++;
		}

		if(extra!=0)
		{
			printf("Invalid input\n");
		}
		else
		{
			return number;
		}
	}
}
int main()
{

	int N=-1;
	int array[1000];
	int i,j,temp;
	while((N<0)||(N>1000))
	{
		printf("Please enter N\n");
		N=ValidateInput();
	}
	for(i=0;i<N;i++)
	{
		array[i]=ValidateInput();
	}
	for(i=0;i<N-1;i++)
```

```
	{
		for(j=i+1;j<N;j++)
		{
			if(array[i]<array[j])
			{
				temp=array[i];
				array[i]=array[j];
				array[j]=temp;
			}
		}
	}
	printf("\n****************************************\n");
	for(i=0;i<N;i++)
	{
		printf("%d\n",array[i]);
	}
	return 0;
}
```