## CS 1713
Introduction to Computer Programming II
Midterm Solutions

<table>
<thead>
<tr>
<th>Question</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1</td>
<td></td>
</tr>
<tr>
<td>Question 2</td>
<td></td>
</tr>
<tr>
<td>Question 3</td>
<td></td>
</tr>
<tr>
<td>Question 4</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

NAME:________________________________________

**Instructions**
1. Do all of the 4 problems
3. You have 50 minutes for the exam
4. Show all your work
5. Do not separate midterm papers

<table>
<thead>
<tr>
<th>Easy</th>
<th>Difficulty Level</th>
<th>Difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. (30 pts) Complete the following program to find if there are two numbers in the array whose sum is 10. For example, the array \(\{1, 2, 3, 4, 5, 6\}\) has 4 and 6 at index positions 3 and 5 with respectively with sum 10. If there are multiple pairs with sum 10, just print one of them.

**Solution:**

```c
#include <stdio.h>
#include <math.h>

int main()
{
    int i,j;
    double num[6];
    double sum = 10;
    int found = 0, first, second;

    printf("Enter 6 doubles\n");
    for (i=0; i<6; i++)
        scanf("%lf",&num[i]);

    for (i=0; i<6; i++)
        for (j=i+1; j<6; j++)
            if (num[i]+num[j] == sum)
            {
                found = 1;
                first = i;
                second = j;
            }

    if (found == 1)
        printf("num[%d] and num[%d] has desired sum",first, second);
    else
        printf("none of the pairs have desired sum\n");
    return(0);
}
```
2. (20 pts) Trace the execution of the following program. What will be the final values of array \textit{a} printed?

```c
#include <stdio.h>
#include <stdlib.h>

int main()
{
    int a[5]={1,2,3,4,5};
    int i,j,temp;

    for (j=1; j<5; j++)
        for (i=0; i<5-j; i=i+2)
            {
                printf("%d %d\n",i,i+j);
                temp = a[i];
                a[i] = a[i+j];
                a[i+j] = temp;
            }

    for (i=0; i<5; i++)
        printf("a[%d] = %d\n",i,a[i]);
}
```

Solution:

0 1
2 3
0 2
2 4
0 3
0 4

\textit{a[0]} = 2
\textit{a[1]} = 1
\textit{a[2]} = 5
\textit{a[3]} = 4
\textit{a[4]} = 3
3. (20 pts) What is the output of the following program? Show all your work for partial credit.

```c
#include <stdio.h>
int function1(int a, int b)
{
    return(a+2*b);
}
int function2(int a)
{
    return(2*a+1);
}
int main()
{
    int i=2;
    int x;

    while (i<10)
    {
        if (i>5)
            x = function1(i+1,i+1);
        else
            x = function2(i+1)-i;
        printf("%d\n",x);
        i = i + 1;
    }

    return(0);
}
```

**Solution**

5
6
7
8
21
24
27
30
4. (30 pts) Write a complete program to compute the following expression. Read the value of \( n \) from the user and write a single loop to evaluate the expression. Do not use pow function in your program.

\[
\sum_{i=1}^{n} \frac{1}{2^i} - \sum_{i=1}^{n} \frac{1}{3^i}
\]

Solution:

```c
#include <stdio.h>

int main()
{
    int n,i;
    float sum2 = 0;
    float pow2=2;
    float pow3=3;

    printf("Enter n\n");
    scanf("%d",&n);

    for (i=1; i<=n; i=i+1)
    {
        sum2 = sum2 + 1.0/pow2 - 1.0/pow3;
        pow2 = pow2*2;
        pow3 = pow3*3;
    }

    printf("Sum2 = %f\n",sum2);
    return(0);
}
```