Université d'Ottawa
Faculté de génie

École de science informatique
et de génie électrique

uOttawa
L'Université canadienne
Canada's university

University of Ottawa
Faculty of Engineering

School of Electrical Engineering
and Computer Science

# GNG 1106C: Fundamentals of Engineering Computation

## Solution to MIDTERM EXAM

**Duration:** **90** minutes **Date**: Sunday, 08 Nov 2015@09:00AM

**Notes**

1. NO calculators are allowed.
2. DO NOT un-staple, tear off, or otherwise separate pages!
3. This exam is closed book.
4. Questions are independent; i.e., the variables of one question do not carry over to the next.
5. Each multiple-choice question has only one correct answer (The most correct one). Read all choices before selecting an answer.
6. Enter the correct answer for multiple choice questions in the computer readable sheet.
7. Enter your name and student number in the fields below:

First Name: _____

Last Name: _____

Student Number: _____

**Question 1**

For the following questions, what is the output of the given program segment?

Q1.
```
int i = 1;
while (i < 4)
{
if (i%2 == 0)
        printf("%d\n", i);
else
        printf("%d   ", i);
i++;
}
```

A. 1
2
B. 1 2
**C. 1 2**
**3**
D. 1 2 3
E None of the above.

Q2.
```
int i, j;

for (i = 2; i > 0; i--)
{
        for (j = 0; j < i; j++)
                printf("*");
                printf("%d ", i+j);
}
```

A. **4 **2
B. *2 *3 *1
C. **2 *3 1
**D. **4 *2**
E. None of the above.

Q3.
```
int counter = 1;
while (counter <= 10)
{
        if (counter%3 == 0)
        {
        counter ++;
        printf("%d:", counter);
        }
counter ++;
};
```

A. 4:7:10
B. 4:8:10:
C. 1:2:4:7:10
**D. 4:7:10:**
E. None of the above.

Q4.
```
int frog, max;

frog =5; max = 9;
while (frog < max)
        frog=frog+2 ;
        max++ ;
printf("%d", max);
```

A. 13
B. 11
**C. 10**
D. 12
E. None of the above

**Question 2**

Assume the following declaration for the next questions, and find their output.

```
int a, b, c;
float x, y, z=0.0;
a = 9; b = 4; x = 3.8; y = 4.5;
```

Q5.
```
z == x + b + 1;
printf("%f", z);
```

A. 8
B. 8.800000
C. 3.8 + 4 + 1
**D. 0.000000**
E. None of the above.

Q6.
```
c = x + a;
printf("%d", c);
```

**A. 12**
B. 12.8
C. 12.800000
D. 3.8 + 9
E. None of the above.

Q7.
```
c = x + a – 1.5;
printf("%f", z);
```

A. 11
B. 11.3
C. 11.300000
D. 3.8 + 9 – 0.5
**E. 0.000000**

Q8.
```
c = a = a - 1;
if (c >1) a = c++; else b = ++c;
printf("%d:%d:%d", a,b,c);
```

A. 1:4:2
**B. 8:4:9**
C. 9:2:2
D. 8:2:2
E. None of the above

**Question 3**

Consider the following program; Answer Q9 and Q10.

```
int  n, r, a, b;
n = 7411;
a = 0; b=0;
while (n != 0)
{
        r = n % 10;
        a++;
        b = b+ r;
        n = n / 10;
}

printf("%d", a); /* First printf */
printf("%d", b); /* Second printf */
```

Q9. The output of the first printf is:

A. 1
B. 2
C. 3
**D. 4**
E. 5

Q10. The output of the second printf is:

A. 11
B. 12
**C. 13**
D. 14
E. 15

**Question 4**

Consider the following program; Answer Q11.

```
#include<stdio.h>
int sq(int);
int main()
{
   int a=1,b=2, x;
   x=sq(++a)+sq(b++);
   printf("%d:%d:%d",x,a,b);
   return 0;
}
int sq(int num)
{
   return num*num;
}
```

Q11. What does the above program print?

A. 5:2:3
B. 5:2:2
C. 8:2:2
**D. 8:2:3**
E. None of the above.

**Question 5**

Consider the following program; Answer Q12.

```
#include<stdio.h>
int a = 20;
int x = 8;
int proc(int);
int main()
{
   int b=2, x=6;
   x=proc(b);
   x=proc(b);
   printf("%d:%d:%d ",a,b,x);
   return 0;
}
int proc(int a)
{
  static b = 2;
  b = b +  2 * a;
  return b;
}
```

Q12. What does the above program print?

A. 20:2:8
B. 4:4:6
C. 4:2:4
**D. 20:2:10**
E. None of the above.

## Question 6

Write a program which computes the sum of the following series:

Sum = 1 - 2/3 + 4/5 - 6/7 + 8/9 - ……. +- N/N+1

The main program will read from the user an **even positive integer N** and will call the function computeSeries(N) to compute the sum of the above series. The main program will then print the Sum. The main program prints an error if the number N is not even or positive.

```
#include <stdio.h>

float computeSeries(int);

/* fill in the code here for the function main */
```

**Students can choose to do it with or without loops.**

```
int main()
{
int N;
float sum;

printf("Please enter N:\n");
scanf("%d", &N);

if (N>0 && N%2)
  sum = computeSeries(N);
else
  printf("Error.\n");

printf("Sum = %f\n", sum);

}
```

## Solution 1

```
/* fill in the code here for the function ComputeSeries */
float computeSeries (int N)
{
  int i, sign;
  float sum = 1;

  sign = 1;
  for (i = 2; i<=N; i = i+2)
  {
    sum = sum - sign*(float)i/(i+1);
    sign = -1*sign;
  }
```

```
  return sum;
}
```

**Another solution:**

```
/* fill in the code here for the function ComputeSeries */
float computeSeries (int N)
{
  int i, iteration;
  float sum = 1;

  iteration=0;
  for (i = 2; i<=N; i = i+2)
  {
    if (iteration%2 == 0)
      sum = sum - (float)i/(i+1);
    else
      sum = sum + (float)i/(i+1);
    iteration++
   }
  return sum;
}
```