RYERSON UNIVERSITY

Everyone Makes a Mark

Ryerson University
Department of Computer Science
CPS125 – DIGITAL COMPUTATION AND PROGRAMMING
Mid-term Examination - Spring 2015
Tuesday, June 9th, 2015, 2:30 P.M. – 4:00 P.M.
Duration: 90 minutes
No Aids Allowed.

Family Name: [redacted] Given Name: [redacted]

Student #: [redacted] Section number: [redacted]

Circle your Professor's name;

Dr. Maryam Davoudpour **Dr. Mehrdad Tirandazian**

Your Ryerson email: [redacted]@ryerson.ca

INSTRUCTIONS:

- This is a closed book examination and computers/calculators cannot be used.
- To achieve full marks, all questions must be correctly attempted.
- Answer the questions clearly with readable handwriting.
- All bags must be placed at the front or back of the room with your switched off cell phones in them.
- No hats that have visors or coats are allowed at your seat.
- Drink bottles are permitted only under the Ryerson examination rules (clear, no label).
- University regulations regarding student behavior will be fully applied.
- Show details of your solution for all questions.
- This booklet has ten pages with twenty-seven questions.

Signature: [redacted]

MCQ	Program 1	Program 2	Total
[redacted]/25	[redacted]/7.5	[redacted]/7.5	[redacted]/40

Good Luck!

[25 Marks – 1 Mark each] **Part A: MCQ** **Mark the correct answer on your scantron.**

i) Convert the following decimal numbers into signed integer 32-bit representation (2's complement for negative numbers).

1. -61

a) 1000 0000 0000 0000 0000 0000 0011 1100
b) 1111 1111 1111 1111 1111 1111 1100 0011
c) 1111 1111 1111 1111 1111 1111 1100 0100
d) 1000 0000 0000 0000 0000 0000 0011 1011
e) none of these

2. 84

a) 1000 0000 0000 0000 0000 0000 0101 1001
b) 0000 0000 0000 0000 0000 0000 0100 1000
c) 0000 0000 0000 0000 0000 0000 0101 0100
d) 1111 1111 11111111 1111 1111 1011 1000
e) none of these

ii) Convert the following binary number (unsigned 32-bit integers) into decimal.

3. 0000 0000 0000 0000 0000 0000 1101 0110

a) 107
b) 142
c) 204
d) 199
e) none of these

4. 0000 0000 0000 0000 0000 0000 1100 0101

a) 123
b) 193
c) 197
d) 227
e) none of these

iii) Convert

5. $C75)_{16}$ to Oct.

a) 1465
b) 1475
c) 6006
d) 6165
e) none of these

iv) Convert the following binary number (signed 32-bit floating point IEEE-754) into decimal:

6. **0100 0001 1100 0000 0000 0000 0000 0000**
   a) 16.0
   b) 32.0
   c) 24.0
   d) 8.0
   e) none of these

v) Convert the following decimal number into binary (signed 32-bit floating point IEEE-754):

7. **-12.0**
   a) 0100 0001 0100 0000 0000 0000 0000 0000
   b) 1100 0001 0100 0000 0000 0000 0000 0000
   c) 1100 0001 0000 0000 0000 0000 0000 0000
   d) 1100 0000 1100 0000 0000 0000 0000 0000
   e) none of these

vi) Identify the invalid C expression or choose "all are valid". Assume all variables are integer (or pointers to integers) and non-zero.

8.	a) r-_x	b) c+-a%4+2	c) x-m+6-v24	d) xf3r6+2	e) all are valid
9.	a) v-r%yy1	b) (p-((p-p-p)))	c) no+no+no3/2	d) x33-1.4z	e) all are valid
10.	a) ant%ont	b) INT-double	c) three*3-x	d) chars/b-c	e) all are valid
11.	a) –x-(z-44))	b) a/scanf+77	c) ha-p%24	d) xaab+-77	e) all are valid
12.	a) p/q/e	b) px+zz/5ccc	c) o-o-4*p	d) -6+m%x	e) all are valid
13.	a) p*q*-r	b) a%b%c	c) 2*(x+y)	d) %d+5	e) all are valid
14.	a) rbc4/440	b) Double-9	c) z0z-a+a%a	d) c*b44p+22	e) all are valid
15.	a) z-33/z+4.3	b) p**2/i/kj	c) i+2-2	d) i/i-11	e) all are valid

vii) Consider the following declarations:

```
int     x = 20, y = 4, z = 1, s = 3;
double  k = 2.5, a = -5.0, b = 8.0, c = -1.0;
double  *p = &k;
```

Determine the exact output printed on the standard output for the followings where a space is indicated with the character #. For example for the statement **printf ("%5d",x);** the answer will be **###20**. If a result or expression is invalid, select "none of these".

16. printf ("%5.2lf $0", +a-x-4);

a) ###-29 b) -29.00 c) 12.0 d) -12. e) none of these

17. printf ("%3d", (int)*p*y);

a) 0 b) ##8 c) #10 d) 10.0 e) none of these

18. printf ("%-4d", 5-z/s);

a) 0### b) 4.5# c) ###4 d) 5### e) none of these

19. printf ("%5.2lf", (double)b/c);

a) ##8.0 b) -8.00 c) #8.00 d) #-8.00 e) none of these

20. printf ("%-6.1", *p*x);

a) ##50.0 b) -5.00# c) #50.00 d)50.0## e) none of these

viii) Identify the correct C statement to solve the following problems:

21. Calculate the product of Three integer variables p and q and z.

a) r = p ** q**z; b) r= p.q.z; c) r = (pqz); d) r = (p) * (q) * (z); e) none of these

22. Divide a double variable x by 25.

a) p = p% 25; b) p = p/ 5 / 5; c) p = p / 5 * 5; d) p = p* 25 / 5; e) none of these

viii) What are the output s of the following C Programs:

23.

```
#include <stdio.h>

void
main (void)

{
     int i, j, a = 2, b = 1;

   /* for loop execution */
   for(i = 1; i < 3; i++ )
        for (j = 1; j <= 2; j++)
        {
        a = a + b;
        b++;
        }

      printf("value of a: %d\n", a);
}
```

a) 11 b) 2 c) 13 d) 12 e) none of these

24.

```
#include <stdio.h>

void
main (void)

{
     int a = 12, b = 3 , c= 18;

   if ( a < 10 || b > 2 && c < 10 )

        a = a + b;

      printf("value of a: %d\n", a);
}
```

a) 3 b) 15 c) 12 d) 21 e) none of these

25.

```
#include <stdio.h>

int
main(void)
{  .

      int a, b, *c, *d, e;

      a = 8;

      b = a * 2;

      c = &b;

      d = &a;

      e = *c + *d;

      *d = b;

      d = &b;

      *c = *d + a / b % *c;


      printf("a= %d, b= %d, e= %d \n", a, b, e);

      return (0);
}
```

a) 16 2 17

b) 16 17 24

c) 17 2 16

d) 16 24 17

e) none of these

26. [7.5 Marks]

Write a C program consisting of a user defined function called ***midterm*** which does the following:

(i) ***midterm function*** should calculate the sum of first *'N'* natural numbers and also finds the even and odd numbers in that range.
(ii) ***midterm function*** should display the even and odd numbers.
(iii) ***main() function*** should display the sum of first *'N'* natural numbers in a file called "program.txt".

e.g#1.

Enter an integer number
4

1 is an odd
2 is an even
3 is an odd
4 is an even

file called "program.txt" should contain 10

e.g#2.

Enter an integer number
7

1 is an odd
2 is an even
3 is an odd
4 is an even
5 is an odd
6 is an even
7 is an odd

file called "program.txt" should contain 28

27. [7.5 Marks]

Write a C program including both a ***main()*** and a function called ***Greatest***. ***main()*** reads three doubles (call them *num1*, *num2*, *num3*) from the standard input. ***main()*** then calls and passes the three double values to the function ***Greatest***. ***Greatest*** using the nested ***if – else*** conditions and ***relation and logical operators*** computes the largest amongst the three numbers and returns the largest value to the ***main()***.
Finally, ***main()*** prints the results to the standard output.