

**MIDDLE EAST TECHNICAL UNIVERSITY**  
**Department of Computer Engineering**

**CEng 230: Introduction to C Programming**

2008 Spring

Midterm

75 min.

Surname	Name	Student ID	Grading
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**Part I: Multiple-Choice** (52 pts.)

(4 pts. each)

1. What will be the value of x after the following program segment is executed?

```
x = 4 / 2 * 3 + 5 % 2 * 3 ;
```

a) 9  
b) 18  
c) 5  
d) 3

2. What will be the value of x after the following program segment is executed?

```
double x;  
int y = 5;  
x = y / 2 + y / 4.0 ;
```

a) 3.75  
b) 3.0  
c) 3.25  
d) 3.5

3. What will be the value of x after the following program segment is executed?

```
int x = 2, y = 5, z = 5;  
x = (y > 5) && (y < 10) || (z == y);
```

a) 0  
b) 2  
c) 5  
d) 1

4. Which of the following C statements is equivalent to the mathematical formula  $y = bx^4 + 3$  ?

a)  $y = b * x * x * x * x + 3$  ;  
b)  $y = b * x * x * x * x * (x + 3)$  ;  
c)  $y = (b*x) * (x*x) * (x+3)$  ;  
d)  $y = (b*x) * x * (x*x) + 3$  ;

5. If  $x=5$  and  $y=4$ , what will be the output of the following program segment?

```
if (x > 4)  
if (y > 3) printf("1");  
else  
printf("2");  
printf("3");
```

a) 1  
b) 2  
c) 13  
d) 23

6. What will be the value of x after the following program segment is executed?

```
x = 0;  
for (i = 0; i < 5; i = i + 1)  
for (j = 0; j < i; j = j + 1)  
x = x + 1;
```

a) 5  
b) 10  
c) 15  
d) 25

7. What will be the value of x after the following program segment is executed?

```
int x, i; x = 0; i = 10;  
while (i != 0){  
++x;  
i = i - 2;  
}
```

a) 5  
b) 6  
c) 7  
d) 8

8. What will be the output of the following program segment?

## A

```

x = 10;
y = 5;
while (x > y){
    switch (y){
        case 2 :
        case 3 : x = x - 1;
        case 4 : x = x - 2;
        case 5 : x = x - 3;
    }
    y = y - 1;
}
printf("%d \n",x);

```

**a) 2**  
**b) 1**  
**c) 5**  
**d) 4**

9. Which while-loop is equivalent to the following for-loop?

```

sum = 0;
for (i = 1; i <= 100; i = i + 1)
    sum = sum + i;

```

- |  |  |
|--|--|
| <p><b>a)</b> i = 1; sum = 0;<br/>while (i &lt;= 100) {<br/>    i = i + 1;<br/>    sum = sum + i; }</p> <p><b>b)</b> i = 1; sum = 0;<br/>while (i &lt; 100) {<br/>    i = i + 1;<br/>    sum = sum + i; }</p> | <p><b>c)</b> i = 1; sum = 0;<br/>while (i &lt;= 100) {<br/>    sum = sum + i;<br/>    i = i + 1; }</p> <p><b>d)</b> i = 1; sum = 0;<br/>while (i &lt; 100) {<br/>    sum = sum + i;<br/>    i = i + 1; }</p> |
|--|--|

10. Which while-loop is equivalent to the following do-while-loop?

```

do {
    x = x + y;
} while (x < z);

```

- |  |  |
|--|--|
| <p><b>a)</b> while (x &lt; z)<br/>    x = x + y;</p> <p><b>b)</b> x = x + y;<br/>while (x &lt; z)<br/>    x = x + y;</p> | <p><b>c)</b> if (x &lt; z) x = x + y;<br/>while (x &lt; z)<br/>    x = x + y;</p> <p><b>d)</b> while (x &gt; z)<br/>    x = x + y;</p> |
|--|--|

11. Which nested-if is equivalent to the following switch?

```

switch (x) {
    case 1: printf("1");
    case 2: printf("2"); break;
    default: printf ("3");
}

```

- |  |   |
|--|---|
| <p><b>a)</b> if (x == 1)<br/>    printf("1");<br/>else if (x == 2)<br/>    printf("2");<br/>else<br/>    printf("3");</p> <p><b>b)</b> if (x == 1) {<br/>    printf("1");<br/>    printf("2");<br/>}<br/>else if (x == 2)<br/>    printf("2");<br/>else<br/>    printf("3");</p> | <p><b>c)</b> if (x == 1) {<br/>    printf("1");<br/>    printf("2");<br/>    printf("3");<br/>}<br/>else if (x == 2) {<br/>    printf("2");<br/>    printf("3");<br/>}<br/>else<br/>    printf("3");</p> <p><b>d)</b> None of the above</p> |
|--|---|

12. What exact range of values of variable x does the following code segment display the letter 'B'?

# A

```
if (x >= 0)
  if (x > 10)
    if (x >= 20)
      printf("D\n");
    else
      printf("C\n");
  else
    printf("B\n");
else
  printf("A\n");
```

- a)  $x \leq 10$
- b)  $0 < x < 10$
- c)  $0 \leq x < 20$
- d)  $0 \leq x \leq 10$

13. What will be the value of x after the following program segment is executed?

```
int i, x; x = 0; i = 100;
while (i > 0) {
  x++;
  i = i / 2;
}
```

- a) 6
- b) 7
- c) 8
- d) 9

**Part II: Short-Answer** (48 pts.)  
(6 pts. each)

14. What will be the output of the following program segment?

```
for (i=1; i<5; i++) {
  for (j=1; j<=i; j++)
    printf("*");
  printf("\n");
}
```

**Answer:** (Write one character per box; use as many boxes as necessary)


15. What will be the output of the following program segment?

```
int n = 12, j = 2;
while (j <= n) {
  if (n % j == 0){
    n = n / j;
    printf("%d ", j);
  }
  else j++;
}
```

**Answer:** (Write one character per box; use as many boxes as necessary)

--	--	--	--	--	--	--	--

16. Write a single if-statement to assign 1 to the variable x if the variable y satisfies the following condition:  
 $0 < y \leq 10$  or  $y > 20$

**Answer:**

