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Question 1) [20 Marks] Multiple Choice Questions – Please select the best answer for each of the following questions

(1) Given the following switch statement:

```
switch(k*=2){
    case  2: printf(" two ");
    case  4: printf(" four ");
    case  8: printf(" eight ");
}
```

What is the output if k =2 ?

a) two b) four c) four eight d) None

(2)
```
int x = 5; int y = 2; float z = x/y, k = x/(float)y;
printf("%f - %f", z, k);
```

The output of `printf` is:

a) 2.5 – 2.5 b) 2.5 – 2.0 c) 2.0 – 2.5 d) 2 – 2.5

(3) Every function prototype must contain at least one parameter

a) True b) false

(4) Let x and y be integers having values `a = 4` and `b = 3`, what is the value of

```
((a + b) * b % a + (a + b % b))
```

is:

a) 0 b) 5 c) 6 d) None

(5) Division by zero is considered a

a) Logical b) Syntax c) Run-time d) None of those types of error

(6) What is the equivalent in octal for the hexadecimal number $(28A)_{16}$?

a) $(1721)_8$ b) $(1621)_8$ c) $(1212)_8$ d) $(2134)_8$

(7) What is the binary representation of letter 'B' using odd parity?

a) 11000010 b) 01000010 c) 11001110 d) 01101100

(8) $(2E1F)_{16} = (\quad)_4$

0 0 1 0 1 1 1 0 0 0 0 1 1 1 1

2 3 2 0 1 3 3

a) 2330132 b) 1320233 c) 2320133 d) None

(9) `int x = 7; int y =3; int result = x == y; printf("%d", result);`

The output of `printf` is:

a) 2.33 b) 2 c) 1 d) 0

(10)
```
int x = 1, y = !x;
if( y )
    printf("y -");
    printf("x -");
```

x = 1
y = 2

The output of `printf` is:

a) y - b) y - x - c) x - d) x - y -

12

Question	1	2	3	4	5	6	7	8	9	10
Answer	b	c	a	b	b	c	a	c	d	b

Question 2) [14 Marks]: Write an algorithm that reads the salaries of **n** number of employees. There are female and male employees. The algorithm should find and print the average salary of the male employees before and after taxes. Assume that the income tax rate is **16%**.

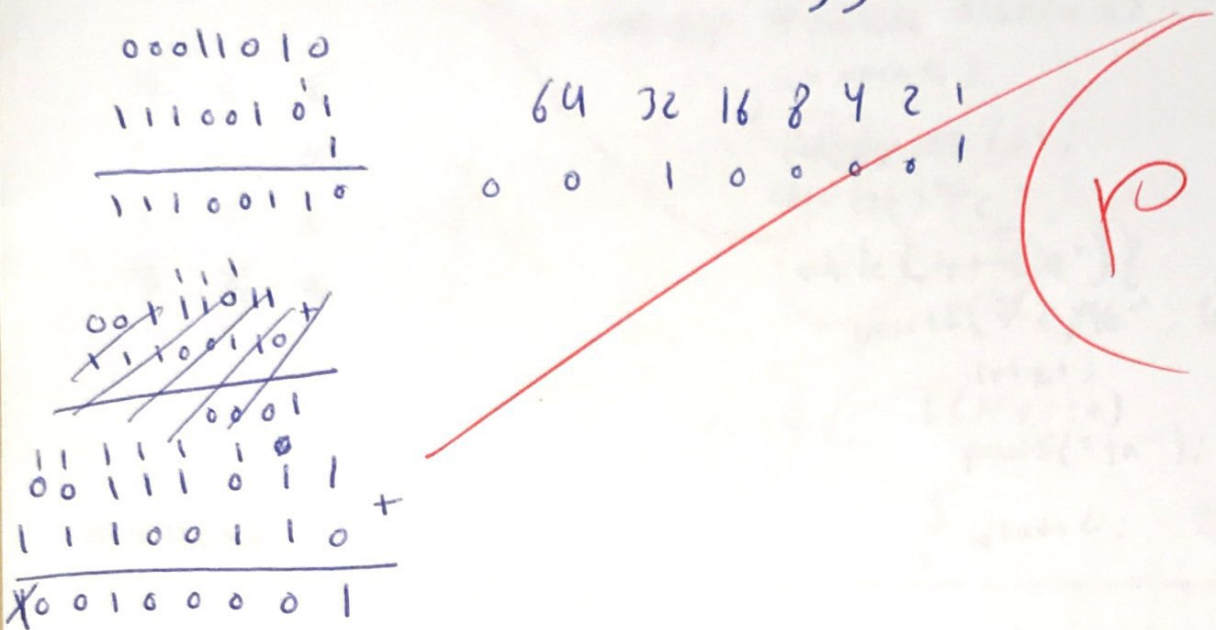
Set women equal zero
~~Set sum equal zero~~
Set men equal zero
Set counter equal zero
Ask user to enter salary or -1 to stop
Read salary and save as sal
while sal not equal to -1
    if sal is for male
        Increment men by one
    else
        increment women by one
    increment counter by one
    End if
    Ask user to enter salary or -1 to stop
    Read salary and save as sal
End while
if men larger than zero
    set avg equal men divided by counter
    print avg to screen
    set avg equal avg multiply by 1.16
    print avg to screen
End if

new n — 2
Pen/counter? 1
— 1
9

Question 3) [20 Marks]

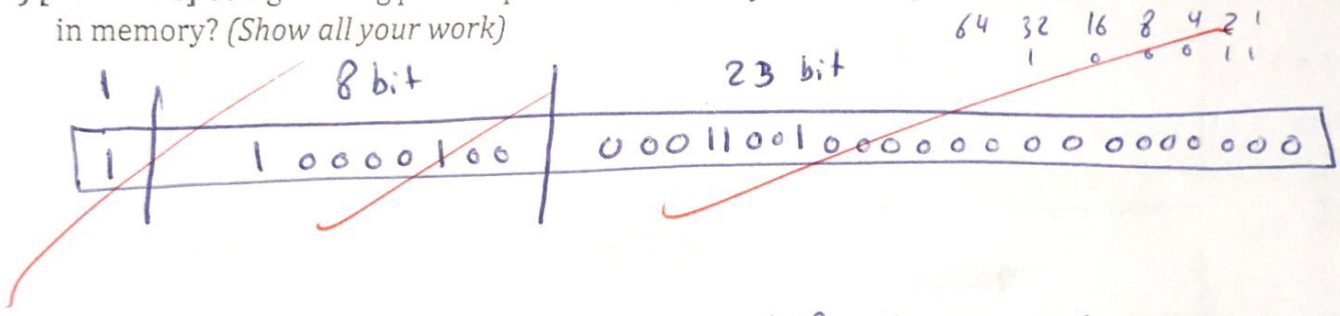
A) [10 Marks] Solve the following math expression, using two's complement with 8-bit representation. *Show all the steps of your work.*

$(111011)_2 - (11010)_2 = (00100001)_2 = (\ 33\ )_{10}$



0.125 × 2 = 0.25
0.25 × 2 = 0.5
0.5 × 2 = 1.

B) [10 Marks] Using floating point representation, how you could represent the float value -35.125 in memory? *(Show all your work)*



Question 4) [16 Marks]

A) [10 Marks] Using a for loop, write a code fragment to print the letters from *C* to *M* in reverse order (M -> C) as follows:

```
M  L  K
J  I  H
G  F  E
D  C  B
```

```
#include <stdio.h>
int main()
{
    int i=1;
    char let='C';
    while(let<='M'){
        printf("%c ", let);
        let++;
        if(i%3==0)
            printf("\n");
        i++;
    }
    return 0;
}
```

B) [6 Marks]

```
for  ( k = 2;  k < 6;  k++ )
{
      for  (i = 1; i <= 5 - k;  i = i + 1)
          printf("A");
      for  (j = 1; j < 2 * k - 1;  j = j + 2)
          printf("B");
      printf("\n");
}
```

Question 5) [30 Marks]:

A) [6 Marks] What is the output of the following loop:

```
x = 4;
while (++x < 12){
    if (x == 10)
        continue;
    printf("%d\n", x*2);
}
```

B) [12 Marks] Complete the following function called **sumOfOddDivisors** which takes a positive integer as a parameter called *x* and returns the sum of odd divisors of the number x. Use for and if structures to solve this problem.

```
int  sumOfOddDivisors ( int  x ){
int i, result=0;
for (i=1; i<=x; i+=2) {
if (x%i==0)
printf("%d = ", i);
result = result + i;
}
printf("%d", result);
return result;
}
```

C) [12 Marks] Complete the following program that reads the value of *x* from a file called *nums.txt* and then calls function *sumOfOddDivisors* and prints the value returned by that function to the screen.

```
#include <stdio.h>
int sumofoddDivisors (int);

int main ( ){
int x, sum;
FILE *in;

in = Fopen ("nums.txt", "r");
Fscanf (in, "%d", &x);
sum = sumofoddDivisors (x);
printf ("%d", sum);
Fclose (in);

return 0; }
```