Homework #1

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Exercise 1

**public** **class** Alo {

**public** **static** **void** main(String [] args) {

**int** a=6,b=8,c=10, //declaring and initializing 3 variables of type int

sum=a+b+c; //declaring the sum variable and assigning the sum of the 3 integers to it

**double** average=sum/3; //declaring the average variable of type double and assigning the value of sum/3 to it

System.***out***.print("This is the average of 3 given integers: " + average); //printing the average of 3 integers on the console

}

}

Exercise 2

a)(101)10 = (1100101)2 1)101/2=50(1-rem.) 2) 50/2=25(0-rem.) 3)25/2=12(1-rem) 4)12/2=6(0-rem)

5)6/2=3(0-rem.) 6)3/2=1(1-rem.) 7)1/2=0(1-rem.)

By writing the remainders from 7-1 we’ll have 1100101 as a binary number

b) (3180)10 = (6154)8 1)3180/2=397(4-rem.) 2) 397/8=49(5-rem.) 3)49/8=6(1-rem) 4)6/8 =0(6 -rem)

By writing the remainders from 4-1 we’ll have 6154 as an octal number

c) (20191)10=(4EDF)16 1)20191/16=1261(15-rem.) 2) 1261/16=78(13-rem.) 3)78/16=4(14-rem)

4)4/16=0(4-rem)

By writing the remainders from 4-1 we’ll have 4EDF as a hexadecimal number (14=E,13=D,15=F)

d) (1011100010)2=2+32+64+128+512 = (738)10

e) (1011101011001)2 = (13561)8 1)001=1 2)011=3 3)101=5 4)011=3 5)001=1

By writing what we got from 1 to 5 in ascending order we get 13531 as an octal number

f) (10101110110100)2= (2BB4)8 1)0010=2 2)1011=11=B 3)1011=11=B 4)0100=4

By writing what we got from 1 to 4 in ascending order we get 2BB4 as a hexadecimal number

g) (4177)8=(100001111111)2 1)4=100 2)1=001 3)7=111 4)7=111

By writing what we got from 1 to 4 in ascending order we get 100001111111 as a binary number

h) (3210)8=1672=3\*(8^3)+2\*(8^2)+1\*8+0

i) (30F)16=(001100001111)2 1)3=0011 2)0=0000 3)F=15=1111

By writing what we got from 1 to 3 in ascending order we get 001100001111 as a binary number

f) (A9C2)16=(43458)10 =10\*(16^3)+9\*(16^2)+12\*16+2\*1

Exercise 3

1 **int** x = 119; //declares variable x of type int and assigns value of 119

2 **int** y, z; //declares variables y and z

3 y = x++; // assigns the value of x (119) to y and increases x by one (120)

4 z = ++x; //increases value of x(120) by one (x=121) and assigns 121 to z

5 x = ~z; //z=000…..01111001 ~z=1111………10000110= - 122

6 **boolean** check1 = (y == z);//declares check1 variable of type boolean,checks if y=z,since y ! =z,assigns value of ***false*** to check1

7 **boolean** check2 = (x < z); );//declares check2 variable of type boolean,checks if x<z,since

-122<121,assigns value of ***true*** to check2

8 **boolean** check3 = check1 || check2; );//declares check3 variable of type boolean,if any of the 2 operands is ***true*** assigns value of 2 to check3,in our case check2 is ***true*** so check3 is also ***true***

9 y = z | (x + 1);//calculates x+1=-122+1=-121,does bitwise or with 121(0000…..01111001 | 1111…10000110) and gets 1111…..11111111 as a result which is equal to -1 so it assigns the value of

-1 to y

10 x = y \* 1000 % z;//since (\*) and % have the same level of precedence it firstly does (-1)\*1000 then assigns the value of remainder after -1000/121 which is -32 so it’s assigned to x

11 z &= 1;//it takes the value of z and does bitwise and with z and 1 (0000……01111001&0000….00000001) and gets 0000….00000001=1 as a result and assigns to z

12 **boolean** check4 = !check3;//declares variable check4 and assigns value of not check3(since check3= ***true*** not check3= ***false***) to check4,thus check4= ***false***

13 System. ***out***.println("x = " + x + "; y = " + y + "; z = " + z + ";"); // prints x = -32; y = -1; z = 1; and moves to the beginning of the next line

14 System. ***out***.println("check1 = " + check1 + "; check2 = " + check2 + ";"); // prints check1 = false; check2 = true;

15 System. ***out***.println("check3 = " + check3 + "; check4 = " + check4 + ";"); // prints check3 = true; check4 = false;

Exercise 4

a)

**int** a = 10; //declares variable a of type int and assigns value of 10 to it

**int** b = 20; //declares variable b of type int and assigns value of 20 to it

**int** tmp = a; //declares variable tmp of type int and assigns value of a(a=10) to it,so tmp=10

a = b; //assigns value of b(b=20) to a, so a=20

b = tmp;//assigns value of tmp(tmp=10) to b, so b=10

b)

**int** a = 10; //declares variable a of type int and assigns value of 10 to it

**int** b = 20; //declares variable b of type int and assigns value of 20 to it

a = a ^ b; //does bitwise XOR with a(00001010) and b(00010100) and gets value of 00011110=30 and assigns it to a;

b = a ^ b; //does bitwise XOR with a(00011110) and b(00010100) and gets value of 00001010=10 and assigns it to b;

a = a ^ b; //does bitwise XOR with a(00011110) and b(00001010) and gets value of 00010100=20 and assigns it to a;

c)

**int** a = 10; //declares variable a of type int and assigns value of 10 to it

**int** b = 120; //declares variable b of type int and assigns value of 120 to it

**int** c = a & -a; //declares variable c of type int, calculates the result after the bitwise operation OR a & -a((~a)+1) (00001010 & (11110110)) and gets a value of 00000010=2,and assigns 2 to c

**int** d = b & -b; //declares variable d of type int, calculates the result after the bitwise operation OR b & -b((~b)+1) (01111000& (10001000)) and gets a value of 00001000=8,and assigns 8 to c

System.out.println("The results are " + c + " and " + d); // prints The results are 2 and 8

d)

**int** a = 10; //declares variable a of type int and assigns value of 10 to it

**int** b = 128; //declares variable b of type int and assigns value of 128 to it

**int** c = a & (a - 1); //declares variable c of type int ,calculates the result after bitwise AND a(10) & (a-1)(9)

(00001010 & 00001001) and gets a result of 00001000=8,and assigns it to c

**int** d = b & (b - 1);

//declares variable d of type int ,calculates the result after bitwise AND b(128) & (b-1)(127)

(10000000 & 01111111) and gets a result of 00000000=0,and assigns it to d

System.out.println("The results are " + c + " and " + d);

//prints The results are 8 and 0

e)

**int** a = 1; //declares variable a of type int and assigns value of 1 to it

**int** b = 128; //declares variable b of type int and assigns value of 128 to it

a <<= 4;//shifts left the bits with value 1, 4 times (from 00000001 to 00010000),so a gets the value of 16

b <<= 6; //shifts left the bits with value 1, 4 times (from 10000000 to10000000000000),so b gets the value of 8192

System.out.println("The results are " + a + " and " + b);

//prints The results are 16 and 8192