Homework1

Exercise2

1. 101 = 2 \* 50 + 1

50 = 2 \* 25 + 0

25 = 2 \* 12 + 1

12 = 2 \* 6 + 0

6 = 2 \* 3 + 0

3 = 2 \* 1 + 1

1 = 2 \* 0 + 1

(101)10 = (1100101)2

1. 3180 = 8 \* 397 + 4

397 = 8 \* 49 + 5

49 = 8 \* 6 + 1

6 = 8 \* 0 + 6

(3180)10 = (6154)8

1. 20191 = 16 \* 1261 + 15

1261 = 16 \* 78 + 13

78 = 16 \* 4 + 14

4 = 16 \* 0 + 4

(20191)10 (4EDF)16

1. 1011100010

1 \* 29 + 0 \* 28 + 1 \* 27 + 1 \* 26 + 1 \* 25 + 0 \* 24 + 0 \* 23 + 0 \* 22 + 1 \* 21 + 0 \* 20 =

512 + 0 + 128 + 64 + 32 + 0 + 0 + 0 + 2 + 0 = 738

(1011100010)2 = (738)10

1. 1011101011001

001\_011\_101\_011\_001

0 \* 22 + 0 \* 21 + 1 \* 20 \_ 0 \* 22 + 1 \* 21 + 1 \* 20 \_ 1 \* 22 + 0 \* 21 + 1 \* 20

\_ 0 \* 22 + 1 \* 21 + 1 \* 20 \_ 0 \* 22 + 0 \* 21 + 1 \* 20 =

1 \_ 3 \_ 5 \_ 3 \_ 1

(1011101011001)2 = (13531)8

1. 10101110110100

0010\_1011\_1011\_0100

0 \* 23 + 0 \* 22 + 1 \* 21 + 0 \* 20 \_ 1 \* 23 + 0 \* 22 + 1 \* 21 + 1 \* 20 \_

1 \* 23 + 0 \* 22 + 1 \* 21 + 1 \* 20 \_ 0 \* 23 + 1 \* 22 + 0 \* 21 + 0 \* 20 =

2 \_ 11 \_ 11 \_ 4

(10101110110100)2 = (2BB4)16

1. 4177

1 \* 22 + 0 \* 21 + 0 \* 20 \_ 0 \* 22 + 0 \* 21 + 1 \* 20 \_ 1 \* 22 + 1 \* 21 + 1 \* 20

\_ 1 \* 22 + 1 \* 21 + 1 \* 20 =

100\_001­\_111\_111

(4177)8 = (100001111111)2

1. 3210

3 \* 83 + 2 \* 82 + 1 \* 81 + 0 \* 80 = 1536 + 128 + 8 + 0 = 1672

(3210)8 = (1672)10

1. 30F

0 \* 23 + 0 \* 22 + 1 \* 21 + 1 \* 20 \_ 0 \* 23 + 0 \* 22 + 0 \* 21 + 0 \* 20

\_ 1 \* 23 + 1 \* 22 + 1 \* 21 + 1 \* 20 =

0011\_0000\_1111

(30F)16 = (1100001111)2

1. A9C2

10 \* 163 + 9 \* 162 + 12 \* 161 + 2 \* 160 = 40960 + 2304 + 192 + 2 = 43458

(A9C2)16 = (43458)10

Exercise3

1. int x = 119;

// declaration and initialization of x, a variable of type integer

1. int y, z;

// declaration of y and z variables of type integer, without initialization

1. y = x++;

// assignment of the value of x to y, then incrementation of x by 1

// y = 119, x = 120

1. z = ++x;

// incrementation of x by 1, then assignment of the value of x to z

// x = 121, z = 121

1. x = ~z;

/\*

~z is the complement of z

121 = 2 \* 60 + 1

60 = 2 \* 30 + 0

30 = 2 \* 15 + 0

15 = 2 \* 7 + 1

7 = 2 \* 3 + 1

3 = 2 \* 1 + 1

1 = 2 \* 0 + 1

z = (121)10 = (1111001)2 = (0..25..0 1111001)2 ~ (1..25..1 0000110)2 = (-122)10 = ~z

x = -122

\*/

1. boolean check1 = (y == z);

// y = 119 ≠ z = 121

// check1 = false

1. boolean check2 = (x < z);

// x = -122 < z = 121

// check2 = true

1. boolean check3 = check1 || check2;

// check3 = false || true

//(logical or: if one or both values are true, the result is true, otherwise false)

// check3 = true

1. y = z | (x + 1);

/\*

y = 121 | (-122 + 1)

y = 121 | -121

(121)10 = (0..25..0 1111001)2 (i)

(120)10 = (0..25..0 1111000)2

(-121)10 = (1..25..1 0000111)2 (ii)

(bitwise inclusive or: if one or both values are 1, the result is 1, otherwise 0)

(i) | (ii) = (1..32..1)2 = (-1)10

Y = -1

\*/

1. x = y \* 1000 % z;

// x = (-1) \* 1000 % 121

// x = -1000 % 121

// x = -32

1. z &= 1;

/\*

z = 121 & 1

(121)10 = (0..25..0 1111001)2 (i)

(1)10 = (0..31..0 1)2 (ii)

(bitwise and: if both values are 1, the result is 1, otherwise 0)

(i) & (ii) = (0..31..0 1)2 = (1)10

z = 1

\*/

1. boolean check4 = !check3;
2. System.out.println(“x = “ + x + “; y = “ + y + “; z = “ + z + “;”);

// x = -32; y = -1; z = 1;

1. System.out.println(“check1 = “ + check1 + “; check2 = “ + check2 + “;”);

// check1 = false; check2 = true;

1. System.out.println(“check3 = “ + check3 + “; check4 = “ + check4 + “;”);

// check3 = true; check4 = false;

Exercise4

1. int a = 10;

int b = 20;

int tmp = a;

// tmp = 10

a = b;

// a = 20

b = tmp;

// b = 10

1. int a = 10;

int b = 20;

/\*

a = (10)10 = (0..27..0 01010)2

b = (20)10 = (0..27..0 10100)2

(bitwise exclusive or: if one of the values is 1 the other 0, the result is 1, otherwise 0)

\*/

a = a ^ b;

// a = (0..27..0 01010)2 ^ (0..27..0 10100)2 = (0..27..0 11110)2 = (30)10

// a = 30

b = a ^ b;

// b = (0..27..0 11110)2 ^ (0..27..0 10100)2 = (0..27..0 01010)2 = (10)10

// b = 10

a = a ^ b;

// a = (0..27..0 11110)2 ^ ((0..27..0 01010)2 = (0..27..0 10100)2 = (20)10

// a = 20

1. int a = 10;

int b = 120;

/\*

a = (10)10 = (0..28..0 1010)2

b = (120)10 = (0..25..0 1111000)2

(bitwise and: if both values are 1, the result is 1, otherwise 0)

\*/

int c = a & -a;

// -a = ~(a – 1) = ~(9)10 = ~(0..28..0 1001)2 = (0..28..0 0110)2

// c = (0..28..0 1010)2 & (0..28..0 0110)2 = (0..28..0 0010)2 = (2)10

// c = 2

int d = b & -b;

// -b = ~(b – 1) = ~(119)10 = ~(0..25..0 1110111)2 = (0..25..0 0001000)2

// d = (0..25..0 1111000)2 & (0..25..0 0001000)2 = (0..25..0 0001000)2 = (8)10

// d = 8

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

// The results are 2 and 8

1. int a = 10;

int b = 128;

/\*

a = (10)10 = (0..28..0 1010)2

b = (128)10 = (0..24..0 10000000)2

(bitwise and: if both values are 1, the result is 1, otherwise 0)

\*/

int c = a & (a – 1);

// c = (0..28..0 1010)2 & (0..28..0 1001)2 = (0..28..0 1000)2 = (8)10

// c = 8

int d = b & (b – 1);

// d = (0..24..0 10000000)2 & (0..24..0 01111111)2 = (0..32..0)2 = (0)10

// d = 0

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

// The results are 8 and 0

1. int a = 1;

int b = 128;

/\*

a = (1)10 = (0..31..0 1)2

b = (128)10 = (0..24..0 10000000)2

(left shift)

\*/

a <<= 4;

// a = (0..31..0 1)2 << 4 = (0..27..0 10000)2 = (16)10

// a = 16

b <<= 6;

// b = (0..24..0 10000000)2 << 6 = (0..18..0 10000000000000)2 = (213)10 = 8192

// b = 8192

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

// The results are 16 and 8192