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Part 1

Exercise 1:

Decimal	4-bit Binary	Decimal	8-bit Binary	Decimal	16-bit Binary
9	1001	7	0000 0111	255	0000 0000 1111 1111
7	0111	34	0010 0010	192	0000 0000 1100 0000
2	0010	125	0111 1101	188	0000 0000 1011 1100
15	1111	157	1001 1101	312	0000 0001 0011 1000
12	1100	162	1010 0010	517	0000 0010 0000 0101
11	1011	37	0010 0101	264	0000 0001 0000 1000
6	0110	66	0100 0010	543	0000 0010 0001 1111
5	0101	77	0100 1101	819	0000 0011 0011 0011
8	1000	88	0101 1000	1027	0000 0100 0000 0011
13	1101	99	0110 0011	2055	0000 1000 0000 0111
14	1110	109	0110 1101	63	0000 0000 00 1111

Exercise 2:

Decimal	Binary	Hexa.	Decimal	16-bit Binary	Hexadecimal
9	1001	9	255	0000 0000 1111 1111	00FF
127	0111 1111	9F	192	0000 0000 1100 0000	C0
125	0111 1111	7F	188	0000 0000 1011 1100	BC
157	1001 1101	9D	312	0000 0001 0011 1000	138
162	1010 0010	A2	517	0000 0010 0000 0101	205
37	0010 0101	25	264	0000 0001 0000 1000	108
66	0100 0010	42	543	0000 0010 0001 1111	21F
77	0100 1101	4D	819	0000 0011 0011 0011	333
88	0101 1000	58	1027	0000 0100 0000 0011	403
99	0110 0011	63	2055	0000 1000 0000 0111	807
109	0110 1101	6D	63	0000 0000 0011 1111	3F

Exercise 3:

(b: binary, q: octal, h: hexadecimal)

3245q + 247q = 3514q = 0000 0111 0100 1100b
1A7Bh + 26FE7h = 28A62h = 1000 1010 0110 0010b
1101101101b - 10110111b = 10 1011 0110 b
3654q – 337q = 3315 q = 0110 1100 1101 b
3AB7h – 1FAh = 38BD h = 0011 1000 1011 1101 b
36Ah – 576q = 1EC h = 0001 1110 1100 b
64AEh – 1001101b= 62141 q

101101111 b
\+ 100111011 b
110110001 b
110001101b
10111101000 b

1011010 b* 1011b = 11 1101 1110 b
1101000b + 2AB h + 345 q = 3F8 h = 1770 q
3AFh / 1Ch = 21 b = 33 d
3ACh – 562q = 0010 0011 1010 b = 570 d
3FFA h / 327q = 0100 1100 b = 76 d

Exercise 4 (2 marks)

1- Show binary formats of 1-byte unsigned numbers:
   251: 1111 1011 b
   163: 1010 0011 b
   117: 0111 0101 b
2- Show binary formats of 2-byte unsigned numbers:
   551: 0000 0010 0010 0111 b
   160: 0000 0000 1010 0000 b
   443: 0000 0001 1011 1011 b
3- Show binary formats of 1-byte signed numbers:
   -51: 1100 1101 b
   -163: 0101 1101 b
   -117: 1000 1011 b
   -20: 1110 1100 b
4- Show the decimal values of 1-byte unsigned representations: :

   01100011 b = 99 d
   10001111 b = 163 d
   11001010 b = 202 d
   01001100 b = 76 d

Part 2: Explore memory structure of programs

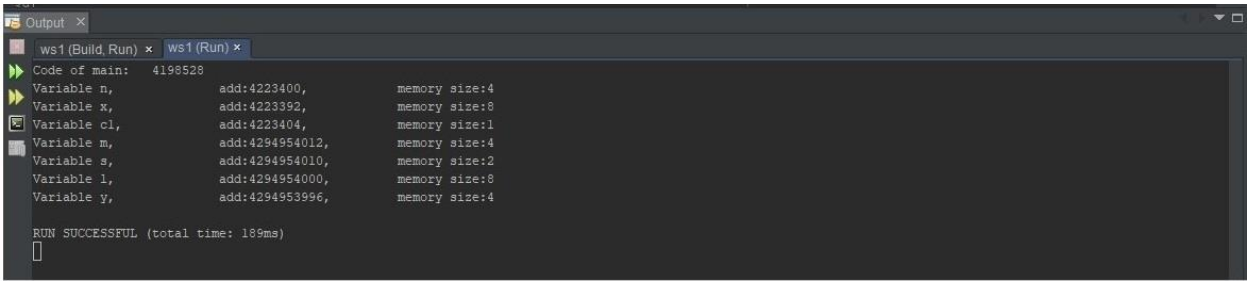
Complete the code of following program then draw it's memory structure (2 marks)

```c
#include <stdio.h>
int n;
double x;
char c1;
int main()
{   int m;
    short s;
    long L;
    float y;
    printf("Code of main:%u\n", &main));
    printf("Variable n, add:%u, memory size:%d\n", &n, sizeof(n));
    /* Your code to view address and memory size of other variables*/
    /* Complete the program, compile and run it */
    /* Draw the memory of the program*/
    getchar();
    return 0;
}
```

```c
#include <stdio.h>
#include <stdlib.h>

/*
 *
 */
    int n;
    double x;
    char c1;

int main(int argc, char** argv) {
    int m;
    short s;
    long l;
    float y;
    printf("Code of main:%u\n", &main);
    printf("Variable n, add:%u, memory size:%d\n",&n, sizeof(n));
    printf("Variable x, add:%u, memory size:%d\n",&x, sizeof(x));
    printf("Variable c1, add:%u, memory size:%d\n",&c1, sizeof(c1));
    printf("Variable m, add:%u, memory size:%d\n",&m, sizeof(m));
    printf("Variable s, add:%u, memory size:%d\n",&s, sizeof(s));
    printf("Variable l, add:%u, memory size:%d\n",&l, sizeof(l));
    printf("Variable y, add:%u, memory size:%d\n",&y, sizeof(y));
    return (EXIT_SUCCESS);
}
```


Output
ws1 (Build, Run)
ws1 (Run)
Code of main: 4198528
Variable n,   add:4223400,   memory size:4
Variable x,   add:4223392,   memory size:8
Variable c1,   add:4223404,   memory size:1
Variable m,   add:4294954012,   memory size:4
Variable s,   add:4294954010,   memory size:2
Variable l,   add:4294954000,   memory size:8
Variable y,   add:4294953996,   memory size:4
RUN SUCCESSFUL (total time: 189ms)