

Question 3

What is the output of the following program?

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

int main()
{
    unsigned int ip[2];
    unsigned char *c, *vp;
    int v;

    vp = (unsigned char *) &v;
    c = (unsigned char *) ip;

    c[0] = 0x21;
    c[1] = 0x91;
    c[2] = 0x86;
    c[3] = 0x99;
    c[4] = 0x06;
    c[5] = 0x51;
    c[6] = 0x79;
    c[7] = 0x74;

    printf("0: 0x%08x\n", ip[0]);
    printf("1: 0x%08x\n", ip[1]);

    memcpy(vp, ip, 2);
    memcpy(vp+2, ip+1, 2);

    printf("2: 0x%08x\n", v);
    printf("3: 0x%02x 0x%02x 0x%02x 0x%02x\n", vp[0], vp[1], vp[2], vp[3]);

    memcpy(&v, c+2, 4);
    v += 0x01100220;
    printf("4: 0x%02x 0x%02x 0x%02x 0x%02x\n", vp[0], vp[1], vp[2], vp[3]);

    return 0;
}
```

Workspace

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Question 4

When the following procedure is called, the value of `x` is `0x68423fe0`, and the contents of the 64 bytes starting with `x` are as follows. I'm printing sets of four bytes in hexadecimal and in decimal.

Address	Hexadecimal	Decimal
0x68423fe0	0x68423ffc	1749172220
0x68423fe4	0x68423fe0	1749172192
0x68423fe8	0x68423ffc	1749172220
0x68423fec	0x68423ff4	1749172212
0x68423ff0	0x68424014	1749172244
0x68423ff4	0x68423fe0	1749172192
0x68423ff8	0x68423fe8	1749172200
0x68423ffc	0x68424008	1749172232
0x68424000	0x68423fe8	1749172200
0x68424004	0x68424004	1749172228
0x68424008	0x68424014	1749172244
0x6842400c	0x68423ffc	1749172220
0x68424010	0x68423fe8	1749172200
0x68424014	0x68424004	1749172228
0x68424018	0x68424000	1749172224
0x6842401c	0x68424018	1749172248

Your job is to tell me the output of the following procedure:

```
#include <sys/mman.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

void a(unsigned int *x)
{
    unsigned int **e, ***f;

    e = (unsigned int **) x;
    f = (unsigned int ***) x;

    printf("0: %d\n", *x);
    printf("1: %d\n", x[5]);
    printf("2: %d\n", **e);
    printf("3: %d\n", e[2][1]);
    printf("4: %d\n", (int) (*f));
    printf("5: %d\n", ***f);

    printf("6: 0x%x\n", (int) (e+8));
    printf("7: 0x%x\n", f[3][0][2]);
    printf("8: 0x%x\n", f[1][1][1]);
    printf("9: 0x%x\n", &(f[12]) - &(f[10]));
}
```

Question 5

When the procedure to the below is called, the value of **a** is 0x61696f40, and the contents of the 64 bytes starting with **a** are as shown below. Each set of four bytes is printed in decimal, hexadecimal, and as four characters.

Address	Decimal	Hexadecimal	As four characters
0x61696f40	1969908590	0x756a6b6e	'n' 'k' 'j' 'u'
0x61696f44	1634299750	0x61696f66	'f' 'o' 'i' 'a'
0x61696f48	1728082432	0x67007200	'\0' 'r' '\0' 'g'
0x61696f4c	103	0x00000067	'g' '\0' '\0' '\0'
0x61696f50	1634299714	0x61696f42	'B' 'o' 'i' 'a'
0x61696f54	1634299739	0x61696f5b	'[' 'o' 'i' 'a'
0x61696f58	1769631488	0x697a6f00	'\0' 'o' 'z' 'i'
0x61696f5c	1634299751	0x61696f67	'g' 'o' 'i' 'a'
0x61696f60	1633905408	0x61636b00	'\0' 'k' 'c' 'a'
0x61696f64	1634299766	0x61696f76	'v' 'o' 'i' 'a'
0x61696f68	1634299757	0x61696f6d	'm' 'o' 'i' 'a'
0x61696f6c	6844025	0x00686e79	'y' 'n' 'h' '\0'
0x61696f70	6553600	0x00640000	'\0' '\0' 'd' '\0'
0x61696f74	1634299716	0x61696f44	'D' 'o' 'i' 'a'
0x61696f78	6643968	0x00656100	'\0' 'a' 'e' '\0'
0x61696f7c	7471208	0x00720068	'h' '\0' 'r' '\0'

Please tell me the output of the following procedure when **Mystruct** has the following definition:

<pre>typedef struct { char b; char *s; int i; } Mystruct;</pre>	<pre>void pm(char *a) { Mystruct *q; char *b; q = (Mystruct *) a; printf("0: %c\n", q->b); printf("1: '%s'\n", q->s); printf("2: %d\n", q->i); q += 3; printf("3: %c\n", q->b); printf("4: '%s'\n", q->s); printf("5: %d\n", q->i); b = a + 16; q = (Mystruct *) b; printf("6: '%s'\n", q->s); printf("7: %d\n", q->i); q = (Mystruct *) a; q = (Mystruct *) q->s; printf("8: %c\n", q->b); printf("9: %c\n", q[1].b); return; }</pre>
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