Question # 1 [40 Points]

struct C {
    int x;
    int y;
    int z;
}

p = (struct C *) malloc(sizeof(struct C));

Assume at run time that struct C is dynamically allocated at address 0x4000

Assume that variable p is allocated at address 0x1000

Translate the following RTL to C code:

r[0] <- 0x1000
r[1] <- m[r[0]]
m[r[1]] <- r[2]

Answer:

p->x = p->z;

OR

*(p.x) = *(p.z)
Question # 2 [30 Points]

int x;
x = 0x7fffffff;
x = x << 1;
x ++;

Assume the code is running on a 32-bit machine. What is the value of x in decimal?

Answer: -1

Question # 3 [30 Points]

int *c;
c = (int *) malloc(5*sizeof(int));
c = &c[2];
*c = c[2];
printf("%d ", *c);
*c = *&c[2];
printf("%x ", c);
*c = *(c+2);
printf("%d\n", *c);

Assume at run time that c is dynamically allocated at address 0x1000

Assume that memory content starting at address 0x1000 is initialized as follows:

<table>
<thead>
<tr>
<th>Address</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x1000</td>
<td>0x00</td>
</tr>
<tr>
<td>0x1004</td>
<td>0x04</td>
</tr>
<tr>
<td>0x1008</td>
<td>0x08</td>
</tr>
<tr>
<td>0x100C</td>
<td>0x0C</td>
</tr>
<tr>
<td>0x1010</td>
<td>0x10</td>
</tr>
<tr>
<td>0x1014</td>
<td>0x00</td>
</tr>
<tr>
<td>0x1018</td>
<td>0x00</td>
</tr>
<tr>
<td>0x100C</td>
<td>0x00</td>
</tr>
</tbody>
</table>

What is the output of the printf() statements?

Answer: 16 1008 16