Because the ZF is set to 1 when all the bits of the result is 0. SF is set to 1 when the most significant bit of the result is 1. So, the most significant bit cannot be 0 and 1 at the same time.

2. [4]  
```
cmpl %ebx, %eax
jne out
  cmpl %ecx, %ebx
  jb out
  je out
L1: addl %eax, %ebx
  addl %ebx, %ecx
out:
```

3. [9]  
```
<table>
<thead>
<tr>
<th>instruction#</th>
<th>instruction</th>
<th>rax</th>
<th>rbx</th>
<th>CF</th>
<th>ZF</th>
<th>SF</th>
<th>OF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initially</td>
<td></td>
<td>0xFFFFFFFF</td>
<td>0x00000001</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>addq %rbx, %rax</td>
<td>0x00000000</td>
<td>0x00000001</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>testq %rbx, %rax</td>
<td>0x00000000</td>
<td>0x00000001</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>cmpq %rbx, %rax</td>
<td>0x00000000</td>
<td>0x00000001</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
```

4. [5] int foo(int a){
```
  int i;
  int result = a+2;

  for(i = 0; i < a ; i++ )
  {  
    result += i + 5;
    result *= i+3 ;
  }

  return result;
```
}