A. Complete the table below. A “2M x 16” memory has 2M words of 16 bits.

<table>
<thead>
<tr>
<th>Memory</th>
<th>Total Bits</th>
<th># of addresses</th>
<th># of address lines</th>
<th># of data lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1M x 8</td>
<td>8M</td>
<td>1M</td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>1K by 4</td>
<td>4K</td>
<td>1K</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>64K x 16</td>
<td>1M</td>
<td>64K</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>4M x 32</td>
<td>128M</td>
<td>4M</td>
<td>22</td>
<td>32</td>
</tr>
</tbody>
</table>

B. Show how to connect these 1M x 16 chips to make a 1M by 32 memory.
C. Show how to connect these 1M x 16 chips to make a 2M by 16 memory. The data outputs are three-state bus drivers.

**Assembly.** D. Write in R4000 assembly language the commands to do the following:

Compare two variables, X and Y. If \( X \geq Y \) then do a non-relative jump to the instruction whose address is in register $5$. Use the SLT instruction.

X is in memory address 0x00002800. Y is in memory address 0x00003900.

```
lw $1, 0x00002800 ($0)     # X
lw $2, 0x00003900 ($0)     # Y
slt $3, $1, $2          # $4 =1 if \( X < Y \)
bne $3, $0, 4           # branch if true ( \( X < Y \) )
j $5           # jump to absolute address in $5
```

***
E. What is the offset address (in 19-bit hex) for the BEQ instruction below to branch back to label "loop"?

```
loop:  add     $2, $3, $2
       beq     $2, $6, ______-8__________
```