Homework Chapter 3 (14 points total)
Due: Wednesday, Feb 14th, in class

1. A memory unit that is said to be 1024 KB would actually contain how many memory cells? What about a memory of 1024 MB? What about a memory of 1 GB? Assume a cell is of standard size. (1 point)

   

3. Assume that a hard disk has the following characteristics: (1 point)
   
   Number of surfaces = 2 (This is a double-sided disk. A single read/write arm holds both read/write heads.)
   Number of tracks per surface = 400
   Number of sectors per track = 32
   Number of characters per sector = 512

   How many characters can be stored on this disk?

4. Consider the following structure of the instruction register. (1.5 points)

<table>
<thead>
<tr>
<th>Op code</th>
<th>Address-1</th>
<th>Address-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 bits</td>
<td>16 bits</td>
<td>16 bits</td>
</tr>
</tbody>
</table>

   a. What is the maximum number of distinct operations that can be recognized and executed by the processor on this machine?

   b. What is the maximum memory size on this machine?

   c. How many bytes are required for each operation?
5. Assume that the variables v, w, x, y, and z are stored in memory locations M[000], M[001], M[010], M[011], and M[100], respectively. Using the machine language instructions shown in Section 3.8, translate the following algorithmic operations into their machine language equivalents. You can overwrite a memory location for an intermediate calculation, if that location is no longer needed. See activity 3.8.2 for an example. (2 pts)
   a. Set v to the value of \((w + x) + (y + z)\)
   
   b. Input v from the user, then display \(v \times 3\)

6. Provide one main difference between CRT, LCD, and Plasma displays. What is one pro and one con for each type of technology? (2 points)

7. Zybooks mentions four different types of computers. For each one, give a possible use case where that type would be better than the others. (2 points)

8. Rank the following programming languages from the lowest level to the highest level: Python, Machine language, and Assembly language. (1 point)

9. If a computer had 10 transistors in an integrated circuit, how many transistors could it have according to Moore’s law after 10 years? Assume that the number of transistors doubles every 2 years. (1 point)

10. Sort the following memory types from slowest to fastest, then by cost from cheapest to most expensive: Hard Drive, Cache, RAM, and Solid State Drive. What is the relationship between cost and speed? (1.5 points)