Read Chapter 6, Section 6.1, of Tanenbaum’s 5th Ed. textbook and work the following problems:

1. Prob. 6-2.
2. Prob. 6-4.
3. Prob. 6-5.
5. Prob. 6-13.
7. Prob. 6-16.
8. Prob. 6-17.

9. Consider a paging system that uses a one-level page table with a virtual memory size of $2^{24}$ bytes, a physical memory size of $2^{21}$ bytes, and a page size of $2^{10}$ bytes. The machine has byte addressing and the entire page table resides in the main memory at all times.

   a. How many entries are there in the page table?
   b. If a page table entry contains a “valid” bit, a “clean/dirty” bit, and the physical page frame number, how many bits are needed for each page table entry? (Note: the “valid” bit acts as a “presence” bit that indicates whether the mapping information in this page map table entry is valid. If “v” = 1, the entry is valid and the page is present in physical memory; if “v” = 0, the entry is not valid and any reference to the corresponding page will generate a page fault.)
   c. With the assumptions in part b. above, how many pages does the page table require? (In this part assume that a page table entry requires an integral number of bytes; e.g., if your answer in part b. is 9 bits, then in part c. assume that a page table entry requires two bytes; hence, round up to the nearest integral number of bytes for each page table entry.)
   d. At a given time in the operation of the machine, a portion of the page table is as given below. What is the physical address corresponding to the virtual address 4980\(_{10}\)? (Hint: $2^{10} = 1024$)

<table>
<thead>
<tr>
<th>Virtual Page Number</th>
<th>Valid Bit</th>
<th>Physical Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>