EE 308 – Homework 6
Due Feb. 25, 2002

For all problems below assume your are using a 68HC912B32 chip with a 16 MHz crystal (which results in
an 8 MHz timer clock).

1. Problem 4 on Page 239 of the text.

2. The prescaler bits are set to \( PR2:0 = 011 \). The first time the \( TCNT \) register is read the value is
\( 0x2345 \). The next time the \( TCNT \) register is read, the value is \( 0xCDEF \). Assuming the time between
reads was less than the overflow period of the counter, how much time (in seconds) passed between
the two reads?

3. The prescaler bits are set to \( PR2:0 = 011 \). The first time the \( TCNT \) register is read the value is
\( 0xCDEF \). The next time the \( TCNT \) register is read, the value is \( 0x2345 \). Assuming the time between
reads was less than the overflow period of the counter, how much time (in seconds) passed between
the two reads?

4. An HC12 has the following data in its memory:

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFC0</td>
<td>CC</td>
<td>05</td>
<td>9F</td>
<td>CD</td>
<td>99</td>
<td>03</td>
<td>84</td>
<td>9C</td>
<td>01</td>
<td>9B</td>
<td>CC</td>
<td>90</td>
<td>66</td>
<td>FC</td>
<td>93</td>
<td>30</td>
</tr>
<tr>
<td>FFD0</td>
<td>7E</td>
<td>E3</td>
<td>4B</td>
<td>7E</td>
<td>E5</td>
<td>38</td>
<td>21</td>
<td>54</td>
<td>05</td>
<td>83</td>
<td>09</td>
<td>34</td>
<td>2A</td>
<td>38</td>
<td>3C</td>
<td>03</td>
</tr>
<tr>
<td>FFE0</td>
<td>41</td>
<td>38</td>
<td>66</td>
<td>F2</td>
<td>7C</td>
<td>13</td>
<td>37</td>
<td>0C</td>
<td>25</td>
<td>F2</td>
<td>0C</td>
<td>38</td>
<td>5F</td>
<td>1B</td>
<td>42</td>
<td>1A</td>
</tr>
<tr>
<td>FFF0</td>
<td>7A</td>
<td>26</td>
<td>21</td>
<td>13</td>
<td>6A</td>
<td>AA</td>
<td>20</td>
<td>1F</td>
<td>4B</td>
<td>38</td>
<td>33</td>
<td>38</td>
<td>45</td>
<td>38</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

(a) What happens to the program counter when the HC12 is powered up or reset? What is the
address of the first instruction the HC12 will execute after a reset?

(b) What is the address of the first instruction the HC12 will execute when it receives a Timer
Overflow interrupt?

(c) What is the address of the first instruction the HC12 will execute when it receives a SPI interrupt?

(d) What is the address of the first instruction the HC12 will execute when it receives a Real Time
interrupt?
5. Below are the values of some timer registers in the HC12:

<table>
<thead>
<tr>
<th>TSCR</th>
<th>TCTL1</th>
<th>TCTL2</th>
<th>TCTL3</th>
<th>TCTL4</th>
<th>TMSK1</th>
<th>TMSK2</th>
<th>TFLG1</th>
<th>TFLG2</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>A4</td>
<td>C2</td>
<td>5F</td>
<td>76</td>
<td>47</td>
<td>03</td>
<td>21</td>
<td>80</td>
</tr>
</tbody>
</table>

(a) Is the Timer enabled?
(b) Is the Timer Overflow Interrupt enabled?
(c) Is the Timer Overflow Flag set?
(d) What is the overflow time for the TCNT register?

6. Write some assembly language code which will enable the timer subsystem, set the timer overflow rate to 65.536 ms, and enable the timer overflow interrupt.

7. Write some C code which will enable the timer subsystem, set the timer overflow rate to 65.536 ms, and enable the timer overflow interrupt.

8. Answer the question from Part 5 of Lab 6.

9. Write the assembly language program for Part 6 of Lab 6.

10. Write the C program for Part 6 of Lab 6.