1. Work Problem 4.1 on page 120 of your textbook.
2. Work Problem 4.2 on page 120 of your textbook.
3. You can transform WARM to COOL in six steps by replacing one letter at each step, as shown below. This sequence is sometimes called a *ladder*. All words in the ladder must be common (not proper) English words. You would like to write a program which finds the shortest ladder between any two given English words, to be input by the user. You will make use of a list of all common 4-letter English words, which you find on the internet. Describe your program. (You don’t necessarily have to write pseudo-code.)

Update: I have found a shorter ladder. The word “corp” is probably illegal anyway, since it is an abbreviation for “corporation” and is not in the Scrabble list.

<table>
<thead>
<tr>
<th>WARM</th>
<th>WARM</th>
</tr>
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<tbody>
<tr>
<td>WARD</td>
<td>WORM</td>
</tr>
<tr>
<td>CARD</td>
<td>WORK</td>
</tr>
<tr>
<td>CARP</td>
<td>CORK</td>
</tr>
<tr>
<td>CORP</td>
<td>COOK</td>
</tr>
<tr>
<td>COOP</td>
<td>COOL</td>
</tr>
</tbody>
</table>
4. You are working on computer which lacks multiplication and addition. However, it can add or subtract 1 or 2. What does this function do? What is its loop invariant?

```c
int double(int n)
// input condition: n >= 0
{
    int p = n;
    int q = 0;
    while(p > 0)
    {
        p = p-1;
        q = q+2;
    }
    return q;
}
```