1. Short Answer

1. -20
2. 3.0
3. $-2^{31} = -2147483648$
4. 6.022e23
5. Many correct answers. e.g. 1500, 2555, 4555
6. java Recipe < cookbook.txt
   java Recipe < cookbook.txt > meal.txt
   java Recipe | java HungryThing

2. Arrays, Functions

   a) $\text{mystery1}(a, 5)$ returns true.
   b) Fill in the trace table to show that $\text{mystery2}(a, 5)$ returns the same thing.

<table>
<thead>
<tr>
<th>target</th>
<th>low</th>
<th>high</th>
<th>mid</th>
<th>return value</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
<pre><code> |        | 2   | 1    |     | true         |
</code></pre>
<p>|        |     |      |     |              |</p>

   c) $\text{mystery1}(a, 20)$ and $\text{mystery2}(a, 20)$ both return false.
   d) These methods check whether target is an element in the array.

3. Performance X. Half a day

   When N doubles, the time increases by a factor of 4. This implies an $N^2$ order of growth. So, if we increase $N = 10000$ by a factor of 10, we hypothesize that the time will increase by a factor of 100. 800 minutes is just over 13 hours. The best answer is half a day.

4. Recursion, Debugging

   a. 

   ```
   \begin{align*}
   \text{func}(3) & \\
   | & 2*\text{func}(2) + 5*\text{func}(1) \\
   | & 2*\text{func}(1) + 5*\text{func}(0) \\
   | & 2*\text{func}(-1) + 5*\text{func}(-2) \\
   \end{align*}
   ```

   b. Change if (j == 1) return 1; to if (j <= 1) return 1;