1. You can argue that the r-loop iterates \textit{at most} \( n \) times (when \( p \) is 1 and \( q \) is \( n \)), and thus that the code is \( O(n^3) \). This is correct. However, if we do a more detailed analysis, we can show that the code is also \( O(n^2) \), which is a better answer because it is giving a “tighter” bound. One way to get this answer is to make a table showing the values of \( p \) and \( q \) each time the r-loop is reached. Then write down the number of iterations the r-loop makes in each case. If you total these up, you’ll see that the code is \( O(n^2) \).

2. Certainly. \textit{Any} loop that is \( O(n) \) is also \( O(n^2) \), by definition of big-oh. Example:

\[
\text{for (int } i=1; i<=n; i++)
\{
\indent \text{System.out.println(i);}
\}
\]

3. \( T(n) \) is \( O(n) \), which means it is also \( O(n \log n) \) and \( O(n^2) \).

4. \( S(n) \) is \( O(n^2) \)

5. The only thing we can say for sure is that sillySort is \( O(n^3) \). It may or may not also be \( O(n \log n) \).

6. The answers are:

- Computing the sum of all the elements in an \( n \times n \) two-dimensional array.
  \( O(n^2) \)
- Printing all elements from the lower triangle of an \( n \times n \) two-dimensional array.
  \( O(n^2) \)
- Inserting an item into an unsorted linked list of \( n \) elements.
  \( O(1) \)
- Inserting an item into a sorted linked list of \( n \) elements.
  \( O(n) \)
- Pushing an item onto a stack of \( n \) elements that is stored as an array.
  \( O(1) \)
- Pushing an item onto a stack of \( n \) elements that is stored as a linked list.
  \( O(1) \)

7. There are many correct answers. Here is one:

\[
\text{public static void whatever(int } n, \text{ int } m)\{
\indent \text{if (} n \text{ } \% \text{ } 2 == 0 \text{) }
\indent \{"\indent \text{for (int } i = 1; i < n+6; i++)
\indent \{"\text{System.out.println("Here we go again.");}\}
\indent \{"\text{for (int } i = n; i < n+m; i++)
\indent \{"\text{System.out.println("and again!");}\}\}
\text{\} else \{\text{System.out.println("Hello");}\}\}
\}
\]