CS 161
Exam #1 Study Guide

In addition to the questions at the end of each chapter, the following questions should help you prepare for the exam. The Exam will cover chapters 1-2.

1. What are the three main areas of study for learning to program? Describe each area. (Hint: remember the Venn diagram at the beginning of the course?)

2. What are the main types of components of most computers, in general terms?

3. The CPU is made up of three elements. What are they?

4. What are the responsibilities of the computer’s operating system?

5. What do we mean by the term “high-level language”?

6. Define the following terms: compiler, source code, object code.

7. What is an IDE? What IDE do we use for this course?

8. What are the five main steps in the development of software?

9. What is an “escape sequence”? Give an example and explain how it is used and what it does.

10. What is procedural decomposition?

11. What are the differences between a compiler error and a runtime error? Give an example of each.

12. Give two good reasons to use methods when writing Java programs.

13. Why do computers use binary numbers?

14. There are two difficulties with how floating point numbers are stored in binary that can lead to imprecise values. What are they?

15. What is the difference between the file MyProgram.java and MyProgram.class?
16. What are the four primitive types in Java?

17. Evaluate the following expression:   \( 2 \times (6 + 4 \times 3 / 2) + 3 / 2 \)

18. Evaluate the following expression:   \( 2345 \% 100 \)

19. Evaluate the following expression:   \( 2345 / 100 \)

20. Evaluate the following expression:   \( 5.0 \times 3 / 2 \)

21. Write a declaration for a variable to hold a value that represents the current outside temperature in Celsius.

22. Write a declaration for a variable to hold a value that represents the number of days since it last snowed, and initialize it to zero.

23. What is produced by the following output statement? Be precise with spacing:

   ```java
   System.out.println("Test =" + 3 / 2 + " minutes.");
   ```

24. What is produced by the following output statement? Be precise with spacing:

   ```java
   System.out.println(2 + 5 + " equals " + 21 - 2 * 7);
   ```

25. Translate the following mathematical formula into an appropriate assignment statement in Java:

   \[ \text{Celsius} = \frac{5}{9} (\text{Fahrenheit} - 32) \]

26. Write appropriate declarations for the variables used in the previous question.

27. Write a class constant to hold the value of \( \pi \), to 2 decimal places.
28. Given the following code:

   ```java
   for (int stars = 0; stars <= 5; stars++) {
       System.out.print("*");
   }
   ```

   Identify the following parts:
   
a) The loop header

b) The name of the loop control variable

c) The loop initialization

d) The loop test

e) The loop update

f) The loop body

g) How many asterisks will be printed?

29. Define the term `scope`. What does it have to do with a variable’s declaration? How do you determine the scope of a variable?

30. Consider the following code:

   ```java
   public class Scope {
   public static void main(String[] args) {
       int x = 42;
       double y = 2.7;
       System.out.print("x = " + x + ";  y = " + y);
       System.out.println(x + y);
       method1();
       method2();
   }
   public static void method1() {
       int i = 12;
       double j = 21.65;
       method2();
       System.out.println(i + j);
   }
   public static void method2() {
   
   ```
19. \hspace{1cm} \textbf{double} x = 19.6; \\
20. \hspace{1cm} \text{System.out.println}(x); \\
21. \hspace{1cm} \} \\
22. \hspace{1cm} \} \\
23. \hspace{1cm} \}

(a) What is the scope of each variable (specify the line numbers)?

(b) Is there a problem with declaring \textit{x} on line 19 in addition to \textit{x} on line 3? Why or why not?

31. Write code to generate the following output, using a loop. Show your work in figuring out any formula, using the method discussed in class and the textbook.

\begin{verbatim}
9 16 23 30 37 44 51
\end{verbatim}

32. What would be printed by the following code:

\begin{verbatim}
for (int i = 1; i <= 5; i++) {
    for (int j = 1; j <= i - 1; j++) {
        System.out.print(" ");
    }
    for (int j = 1; j <= 10 - 2 * i + 1; j++) {
        System.out.print("*");
    }
    System.out.println();
}
\end{verbatim}

33. Write code to produce the following pattern. Your code should declare a constant called \textit{SIZE}, which you then use to control how large the pattern is (the sample below is \textit{SIZE} 5). (Hint: your program should print only one asterisk or space at a time.) Note: there are no blank lines in the figure.

\begin{verbatim}
***** \\
* \\
* \\
****
\end{verbatim}