1. How many values can be represented by
   (a) 5 bits
   (b) 10 bits
   (c) 17 bits
   \[2^n - 1\]

2. Describe the functionality of the `%` operator.
   modulus

3. What is a typecast, and how can you apply one in java?
   conversion from one type to another, (type)

4. How large is
   (a) an int?
   (b) a boolean?
   (c) a float?
   (d) a double?
   32, 8, 32, 64 bits, respectively

5. Explain the issue with floating point values in java, which can be dealt with to an extent by using doubles instead of floats.
   rounding inaccuracy

6. How are strings concatenated in java?
   `+. String. concat()`

7. How does one extract a substring from a string?
   `String.substring()`

8. What string function can be used to find the first instance of a substring in a string?
   `String.indexOf()`

9. How does one determine how long a string is in Java?
   `String.length()`
10. Write a line of code, which uses `System.out.printf`, to print out 3 variables, one each of a character, a floating point value, and an integer.

   `System.out.printf('%c%f%d', c, f, i)`

11. How does one insert a tab into an output statement?

   `\t`

12. What is the format code to print out a string, using `System.out.printf`?

   `%s`

13. Describe the primary difference between the semantics of a `do/while` loop and a `while` loop.

   `do/while runs at least once`

14. How does one jump back to the top of a loop, and begin the next iteration, skipping the remaining lines of code in the loop?

   `continue`

15. What does the `break` statement do?

   `exits the current enclosing loop`

16. What types can be used as the controlling variable in a `switch` statement?

   `integral types`

17. Provide the code for determining if a value is positive, negative, or 0. Include only the necessary lines, and assume you have a variable `x` that you are testing.

   ```java
   if (x > 0)
   }
   else if (x < 0)
   }
   else
   }
   ```

18. What is short circuiting, in the context of Java?

   `stopping evaluation as soon as the truth value of compound statement can be determined`

19. What is the logical AND operator?

   `&&`

20. What is the logical OR operator?

   `||`

21. Explain the difference in semantics of `++i` and `i++`.

   `pre-increment vs. post-increment`

22. Convert the following values to binary, octal, and hex:

   (a) 7

   `0x7, 07, 0b111`
23. For the following mathematical expressions, write the corresponding Java expressions. You may use parentheses to avoid ambiguity.

(a) \( \frac{x + 4}{y + 5} \)
\((x + 4) / (y + 5)\)

(b) \( \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \)
\(\text{Math.pow}(x1 - x2, 2) + \text{Math.pow}(y1 - y2, 2)\)

(c) \( \frac{4}{3} \pi r^3 \)
\(4.0 / 3.0 * \text{Math.PI} * \text{Math.pow}(r, 3)\)

(d) \( 1 < x \leq 20 \text{ or } 3 \geq y \geq 1 \)
\((x <= 20 && x > 1) || (y <= 3 && y >= 1)\)

(e) \( 9 + 5 \frac{x + 4}{y + 5} \)
\(9 + 5 * ((x + 4) / (y + 5))\)

24. For the following Java expressions, write their corresponding mathematical expressions. You may use parentheses to avoid ambiguity.

(a) \( \frac{9}{5}(c + 32) \)
\(9.0 / 5.0 * (c + 32)\)

(b) \( \frac{9 + 5 \cdot 3 \cdot (c + 32)}{x + y} \)
\(9 + 5 \cdot 3 \cdot (c + 32) / (x + y) * 3\)

(c) \( x <= 1 \text{ or } x > 20 \)
\(1 \geq x \text{ or } x > 20\)

(d) \( 2 \cdot x \cdot x - 4 \cdot x + 1 \)
\(2x^2 - 4x + 1\)

(e) \( 2 \cdot x \cdot \text{Math.sin}(y) + \text{Math.cos}(x \cdot x) \)
\(2x \sin(y) + \cos(x^2)\)

25. What happens to the value of a floating point number when you assign to an integer?
truncation

26. Evaluate the following expressions in Java
(a) \( \frac{2}{3} \times 3 \)  
0  
(b) \( \frac{2.0}{3} \times 3 \)  
2.0  
(c) \( \frac{37}{7} \)  
5  
(d) \( 37 \% 7 \)  
2  
(e) \( 4 \% 8 \)  
4

27. What is a gotcha regarding mixing the use of Scanner.next() and Scanner.nextLine()?
   Scanner.next() leaves newline behind, which can be read by Scanner.nextLine(), stripped off, and you can end up with an empty string while there is still more input.

28. What is the decimal equivalent of 0b00101001?
   41

29. Give the syntax, and only the syntax, of a for loop.
   for(initialization; expression; update) statement;

30. What are escape characters, in the context of a string in Java?
   non-printable ASCII values which are entered using a backslash code

31. Write the pseudocode for calculating the new monthly balance in your bank account. Assume there were 3 transactions, and an interest addition. You know how to do this.

32. According to Vizzini, the most famous classic blunder is “Never get involved in a land war in Asia”. Which classic blunder is only slightly less well known?
   Never go against a Sicilian, when death is on the line

33. Who used the line “Lorraine, my density has brought me to you.”?
   George McFly

34. What is the origin of the name Java?
   Coffee or the Indonesian island

35. Stop! Who would cross the Bridge of Death must answer me these questions three (well, four), ore the other side shall see.
   (a) What...is your name?  
   (b) What...is your quest?  
   (c) What...is your favorite color?  
   (d) What...is the air-speed velocity of an unladen swallow?  

   They can either enter their real info, or anything else they want here. Basically, if they answer it, it’s correct.