Critical Thinking Questions

1. Decision Structures

a) If grade is 90 or higher:

```
if (grade >= 90) {
   System.out.println("Great job!");
}
```

b) If number is less than 20 or greater than 50:

```
if (num < 20 || num > 50) {
   System.out.println("Error");
}
```

c) Add 2 to y when y is less than 10:

```
if (y < 10) {
   y = y + 2;
}
```

2. Compare Two Numbers

```
if (num1 > num2) {
   System.out.println("First number is larger.");
} else if (num2 > num1) {
   System.out.println("Second number is larger.");
} else {
   System.out.println("Numbers are equal.");
}
```

3. Even or Odd

a) Using if-else:

```
if (num % 2 == 0) {
   System.out.println(num + " is even");
} else {
   System.out.println(num + " is odd");
}
```

b) Rewritten with switch:

```
switch (num % 2) {
  case 0:
    System.out.println(num + " is even");
    break;
  default:
    System.out.println(num + " is odd");
    break;
}
```

4. Random Numbers

a) Integer between 1 and 50:

```
int num = rand.nextInt(50) + 1;
```

b) Integer between 20 and 100:

```
int num = rand.nextInt(81) + 20;
```

c) Double between 10 and 20:

```
double num = 10 + rand.nextDouble() * 10;
```

5. Logic Errors

Correct version of the code:

```
if (age < 18) {
  System.out.println("child");
} else if (age >= 18 && age < 65) {
  System.out.println("adult");
} else if (age >= 65) {
  System.out.println("senior");
}
```

6. True/False Evaluations

a) true

b) true

c) false

d) true

e) true

f) false

g) true

8. True/False

a) True

b) False (only floating-point have roundoff errors)

c) True

d) True

e) True

f) True

g) True

h) True

i) True

j) True

k) True

l) True