Chapter 4 CRT:

1a) *if (grade >= 90) {*
    System.out.println("Great job!");
    }
1b) *if (number < 20 || number > 50) {*
    System.out.println("Error");
    }
1c) *if (y < 100) {*
    y = y + 2; // or y += 2;
    }

2. *if (num1 > num2) {*
    System.out.println("First number is larger.");
    } else if (num2 > num1) {
    System.out.println("Second number is larger.");
    } else {
    // This 'else' catches the case where neither of the above is true, meaning num1 == num2
    System.out.println("Numbers are equal.");
    }

3a) The operator (%) returns the remainder of a division. If *num % 2 == 0*, the number is perfectly divisible by 2, meaning it is even.

    if (num % 2 == 0) {
    System.out.println("even number");
    } else {
    System.out.println("odd number");
3b) *switch (num % 2) {*
    case 0:
    System.out.println("even number");
    break;
    default: // This catches all other possible remainders (e.g., 1 or -1 for negative numbers)
    System.out.println("odd number");
    break;
}

4a) *(int)(Math.random() * 50) + 1*
4b) *(int)(Math.random() * 81) + 20*
4c) *Math.random() * 10 + 10*

5. In the code, there are a few logical errors related to how the age variable is classified into categories. First, the condition age < 18 correctly identifies children, but it fails to account for individuals who are exactly 18 years old, as they are excluded from both the "child" and "adult" categories. This oversight means that anyone aged 18 will not receive any classification. Second, the condition age > 18 && age < 65 does include most adults, but again, it incorrectly excludes people who are exactly 65 years old, as the code only classifies people older than 65 into the "senior" category. Consequently, someone who is exactly 65 will not be categorized correctly either. The solution is to adjust the inequalities so that individuals who are 18 years old are classified as adults, and those who are 65 or older are classified as seniors, ensuring that all possible ages are correctly categorized.

Fixed Code:

```
if (age < 18) {
    System.out.println("child");
} else if (age < 65) { // If it gets here, age is >= 18. We only need to check if it's < 65.
    System.out.println("adult");
} else { // If it gets here, age is not < 18 and not < 65, meaning age is >= 65
    System.out.println("senior");
}
```

6a) True
6b) False
6c) True
6d) True
6e) True
6f) True
6g) True

8a) True
8b) False – nested if ≠ if-else if
8c) False – switch doesn't allow double
8d) True
8e) False – *(double)* cast not needed for random int
8f) True
8g) True
8h) False – *!* before *&&*
8i) True
8j) False – should be *Math.abs(-3)*

https://g.co/gemini/share/579f8fe96a48

I did not use AI for questions 4 and 8. The reason is that the online textbook has a different question order, which I realized could cause confusion if I relied on AI for those specific answers. I completed those two questions independently to ensure accuracy with the assigned material.