Programming Languages Homework 3

1. (10pt) Exercise 7.9 (d) and (e).

   d. - a or c = d and e

   Answer:

   $((- a)^1 \text{ or } ((c = d)^2 \text{ and } e)^3)^4$

   e. a > b xor c or d <= 17

   Answer:

   $(((a > b)^1 \text{ xor } c)^3 \text{ or } (d <= 17)^2)^4$

2. (10pt) Exercise 7.10 (d) and (e).

   d. - a or c = d and e

   Answer:

   $(- (a \text{ or } (c = (d \text{ and } e)^1)^2)^3)^4$

   e. a > b xor c or d <= 17

   Answer:

   $(a > (b \text{ xor } (c \text{ or } (d <= 17)^1)^2)^3)^4$

3. (10pt) Exercise 7.13.

   a. **Answer:**

```
sum1 = (i_old / 2) + fun(&i_old)
     = (10 / 2) + (3 * (10 + 4) - 1)
     = 5 + 41
     = 46

sum2 = fun(&j_old) + (j_new / 2)
     = (3 * (10 + 4) - 1) + (14 / 2)
     = 41 + 7
     = 48
```

   b. **Answer:**

```
sum1 = (i_new / 2) + fun(&i_old)
     = (14 / 2) + (3 * (10 + 4) - 1)
     = 7 + 41
     = 48

sum2 = fun(&j_old) + (j_old / 2)
     = [3 * (10 + 4) - 1] + (10 / 2)
     = 41 + 5
     = 46
```

4. (10pt) Exercise 7.19.

a. **Answer**

$$x = x_{old} + 4$$
$$= 3 + 4$$
$$= 7$$

b. **Answer**

$$x = x_{new} + 4$$
$$= 8 + 4$$
$$= 12$$

5. (15pt) Programming Exercise 8.3(a) in C.

```
switch(k)
{
    case 1:
    case 2:
        j = 2 * k - 1;
        break;
    case 3:
    case 5:
        j = 3 * k + 1;
        break;
    case 4:
        j = 4 * k - 1;
        break;
    case 6:
    case 7:
    case 8:
        j = k - 2;
        break;
    default:
        printf("Error in switch, k = %d\n", k);

}
```

//default label is optional.

6. (15pt) Programming Exercise 8.4 in C.

```
j = -3;
for (i = 0; i < 3; i++)
{
    int key = j + 2;

    if (key == 3 || key == 2)
        j--;
    else if (key == 0)
        j += 2;
    else
        j = 0;

    if (j > 0)
        i = 2;
    else
        j = 3 - i;
}
```

7. (15pt) Exercise 9.5. Justify your answers.

a. Passed by value

```
value = 2, list = {1, 3, 5, 7, 9}
value = 2, list = {1, 3, 5, 7, 9}
value = 2, list = {1, 3, 5, 7, 9}
```

b. Passed by reference

```
value = 1, list = {2, 3, 5, 7, 9}
value = 1, list = {3, 2, 5, 7, 9}
value = 2, list = {3, 1, 5, 7, 9}
```

c. Passed by value-result

```
value = 1, list = {2, 3, 5, 7, 9}
value = 1, list = {3, 2, 5, 7, 9}
value = 2, list = {3, 1, 5, 7, 9}
```

8. (15pt) Exercise 9.7. Justify your answers.

a. Passed by value : `1, 3`

b. Passed by reference : `2, 6`

c. Passed by value-result : `2, 6`