Question 1:

Find the output of the following program and provide proper parenthesization of the expression:

```c
Copy code
#include<stdio.h>
int main()
{
    int a = 5, b = 10;
    a += b -= a *= b;
    printf("%d %d\n", a, b);
    return 0;
}
```

Solution:

1. **Initial values**:
   a. a = 5, b = 10
2. **Parenthesization and evaluation**:
   a. First, evaluate a *= b:

a = a * b = 5 * 10 = 50.
Now, a = 50 and b = 10.

   b. Then, evaluate b -= a:

b = b - a = 10 - 50 = -40.
Now, b = -40.

   c. Finally, evaluate a += b:

a = a + b = 50 + (-40) = 10.
Now, a = 10.

3. **Final values**:
   a. a = 10, b = -40.

Output:

Copy code

10 -40

Question 2:

Find the output of the following program and provide proper parenthesization of the expression:

```c
Copy code
#include<stdio.h>
int main()
{
    int x = 6, y = 3;
    x -= y += x /= y;
    printf("%d %d\n", x, y);
    return 0;
}
```

Solution:

1. **Initial values**:
   a. x = 6, y = 3
2. **Parenthesization and evaluation**:
   a. First, evaluate x /= y:

x = x / y = 6 / 3 = 2.
Now, x = 2 and y = 3.

   b. Then, evaluate y += x:

y = y + x = 3 + 2 = 5.
Now, y = 5.

   c. Finally, evaluate x -= y:

x = x - y = 2 - 5 = -3.
Now, x = -3.

3. **Final values**:
   a. x = -3, y = 5.

Output:

```diff
Copy code
-3 5
```

Question 3:

Find the output of the following program and provide proper parenthesization of the expression:

```c
Copy code
#include<stdio.h>
int main()
{
    int i = 1, j = 2, k = 3;
    i = j++ + ++k;
    printf("%d %d %d\n", i, j, k);
    return 0;
}
```

Solution:

1. **Initial values**:
   a. i = 1, j = 2, k = 3
2. **Parenthesization and evaluation**:
   a. First, j++ uses j = 2 and then increments j to 3.
   b. Then, ++k increments k to 4 and uses the new value k = 4.
   c. Now, evaluate i = j++ + ++k:

i = 2 + 4 = 6.
Now, i = 6, j = 3, k = 4.

3. **Final values**:
   a. i = 6, j = 3, k = 4.

Output: `` 6 3 4

yaml

Copy code

Question 4:
Find the output of the following program and provide proper parenthesization of the expression:

```c
#include<stdio.h>
int main()
{
    int x = 10, y = 5;
    x = y++ + x-- - --y;
    printf("%d %d\n", x, y);
    return 0;
}
```

Solution:

1. **Initial values**:
   a. x = 10, y = 5
2. **Parenthesization and evaluation**:
   a. First, y++ uses y = 5 and then increments y to 6.
   b. Then, x-- uses x = 10 and then decrements x to 9.
   c. Finally, --y decrements y to 5 and uses y = 5.
   d. Now, evaluate x = y++ + x-- - --y:
x = 5 + 10 - 5 = 10.
   e. Now, x = 10 and y = 5.
3. **Final values**:
   a. x = 10, y = 5.

Output:

Copy code
10 5

Question 5:

Find the output of the following program and provide proper parenthesization of the expression:

```c
Copy code
#include<stdio.h>
int main()
{
    int a = 4, b = 3;
    a *= b += a -= b;
    printf("%d %d\n", a, b);
    return 0;
}
```

Solution:

1. **Initial values**:
      a. a = 4, b = 3
2. **Parenthesization and evaluation**:
      a. First, evaluate a -= b:

a = a - b = 4 - 3 = 1.
Now, a = 1 and b = 3.

      b. Then, evaluate b += a:

b = b + a = 3 + 1 = 4.
Now, b = 4.

      c. Finally, evaluate a *= b:

a = a * b = 1 * 4 = 4.
Now, a = 4.

3. **Final values**:
      a. a = 4, b = 4.

Output:

```
Copy code
4 4
```

Question 6:

Find the output of the following program and provide proper parenthesization of the expression:

c
Copy code
```c
#include<stdio.h>
int main()
{
    int x = 3, y = 2, z = 1;
    x += y *= z -= x;
    printf("%d %d %d\n", x, y, z);
    return 0;
}
```

Solution:

1. **Initial values**:
   a. x = 3, y = 2, z = 1
2. **Parenthesization and evaluation**:
   a. First, evaluate z -= x:

z = z - x = 1 - 3 = -2.
Now, z = -2 and x = 3.
   b. Then, evaluate y *= z:

y = y * z = 2 * (-2) = -4.
Now, y = -4.
   c. Finally, evaluate x += y:

x = x + y = 3 + (-4) = -1.
Now, x = -1.

3. **Final values**:
   a. x = -1, y = -4, z = -2.

Output:

diff

```
Copy code
-1 -4 -2
```

Question 7:

Find the output of the following program and provide proper parenthesization of the expression:

c
```
Copy code
#include<stdio.h>
int main()
{
    int a = 5, b = 2;
    a -= b *= a += b;
    printf("%d %d\n", a, b);
    return 0;
}
```

Solution:

1. **Initial values**:
    a. a = 5, b = 2
2. **Parenthesization and evaluation**:
    a. First, evaluate a += b:

a = a + b = 5 + 2 = 7.

Now, a = 7.

    b. Then, evaluate b *= a:

b = b * a = 2 * 7 = 14.

Now, b = 14.

    c. Finally, evaluate a -= b:

a = a - b = 7 - 14 = -7.

Now, a = -7.

3. **Final values**:
    a. a = -7, b = 14.

Output:

```diff
Copy code
-7 14
```

Question 8:

Find the output of the following program and provide proper parenthesization of the expression:

```c
Copy code
#include<stdio.h>
int main()
{
    int x = 8, y = 3;
    x /= y += x %= y;
    printf("%d %d\n", x, y);
    return 0;
}
```

Solution:

1. **Initial values**:
   a. x = 8, y = 3
2. **Parenthesization and evaluation**:
   a. First, evaluate x %= y:

x = x % y = 8 % 3 = 2.
Now, x = 2 and y = 3.
   b. Then, evaluate y += x:

y = y + x = 3 + 2 = 5.
Now, y = 5.
   c. Finally, evaluate x /= y:

x = x / y = 2 / 5 = 0 (since integer division truncates).
Now, x = 0.

3. **Final values**:

a. x = 0, y = 5.

Output:

```
Copy code
0 5
```

Question 9:

Find the output of the following program and provide proper parenthesization of the expression:

c
```
Copy code
#include<stdio.h>
int main()
{
    int i = 7, j = 4;
    i *= j -= i /= j;
    printf("%d %d\n", i, j);
    return 0;
}
```

Solution:

1. **Initial values**:
    a. i = 7, j = 4
2. **Parenthesization and evaluation**:
    a. First, evaluate i /= j:
i = i / j = 7 / 4 = 1 (integer division).
Now, i = 1 and j = 4.
    b. Then, evaluate j -= i:
j = j - i = 4 - 1 = 3.
Now, j = 3.
    c. Finally, evaluate i *= j:
i = i * j = 1 * 3 = 3.
Now, i = 3.

3. **Final values**:
    a. `i = 3, j = 3.`

Output:

```
Copy code
3 3
```

Question 10:

Find the output of the following program and provide proper parenthesization of the expression:

c

```
Copy code
#include<stdio.h>
int main()
{
    int a = 4, b = 2;
    a += --b + a--;
    printf("%d %d\n", a, b);
    return 0;
}
```

Solution:

1. **Initial values**:
    a. `a = 4, b = 2`
2. **Parenthesization and evaluation**:
    a. First, evaluate `--b`:

`b = b - 1 = 1.`
Now, `b = 1.`

    b. Then, evaluate `a--`:

`a = 4` (used as is, and then decremented to 3 after).

    c. Now, evaluate the expression:

`a = a + (--b + a--) = 4 + (1 + 4) = 4 + 5 = 9.`
Now, `a = 9` and `b = 1.`

3. **Final values**:
   a. a = 9, b = 1.

Output:

```
Copy code
9 1
```

Question 11:

Find the output of the following program and provide proper parenthesization of the expression:

c
```
Copy code
#include<stdio.h>
int main()
{
    int p = 6, q = 4, r = 2;
    p = q++ - --r * p--;
    printf("%d %d %d\n", p, q, r);
    return 0;
}
```

Solution:

1. **Initial values**:
   a. p = 6, q = 4, r = 2
2. **Parenthesization and evaluation**:
   a. First, evaluate --r:

r = r - 1 = 1.
Now, r = 1.

   b. Then, evaluate q++:

q = 4 (used as is, and then incremented to 5).

   c. Then, evaluate p--:

p = 6 (used as is, and then decremented to 5).

   d. Now, evaluate the expression:

p = q++ - --r * p-- = 4 - 1 * 6 = 4 - 6 = -2.
        e. Now, p = -2, q = 5, r = 1.
   3. **Final values**:
        a. p = -2, q = 5, r = 1.

Output:

```diff
Copy code
-2 5 1
```

Question 12:

Find the output of the following program and provide proper parenthesization of the expression:

```c
Copy code
#include<stdio.h>
int main()
{
    int x = 10, y = 5, z = 2;
    x += --y * z++;
    printf("%d %d %d\n", x, y, z);
    return 0;
}
```

Solution:

   1. **Initial values**:
        a. x = 10, y = 5, z = 2
   2. **Parenthesization and evaluation**:
        a. First, evaluate --y:
y = y - 1 = 4.
Now, y = 4.
        b. Then, evaluate z++:
z = 2 (used as is, and then incremented to 3).

c. Now, evaluate the expression:

x += --y * z++ = 10 + 4 * 2 = 10 + 8 = 18.

      d. Now, x = 18, y = 4, z = 3.

   3. **Final values**:

      a. x = 18, y = 4, z = 3.

Output:

```
Copy code
18 4 3
```

Question 13:

Find the output of the following program and provide proper parenthesization of the expression:

c

```
Copy code
#include<stdio.h>
int main()
{
    int i = 5, j = 8, k = 3;
    i = j-- + ++k;
    printf("%d %d %d\n", i, j, k);
    return 0;
}
```

Solution:

   1. **Initial values**:

      a. i = 5, j = 8, k = 3

   2. **Parenthesization and evaluation**:

      a. First, evaluate ++k:

k = k + 1 = 4.

Now, k = 4.

      b. Then, evaluate j--:

j = 8 (used as is, and then decremented to 7).

c. Now, evaluate the expression:

i = j-- + ++k = 8 + 4 = 12.

        d. Now, i = 12, j = 7, k = 4.
    3. **Final values**:
        a. i = 12, j = 7, k = 4.

Output:

Copy code
12 7 4

Question 14:

Find the output of the following program and provide proper parenthesization of the expression:

c
Copy code
```c
#include<stdio.h>
int main()
{
    int a = 6, b = 2;
    a *= b -= a += b;
    printf("%d %d\n", a, b);
    return 0;
}
```

Solution:

    1. **Initial values**:
        a. a = 6, b = 2
    2. **Parenthesization and evaluation**:
        a. First, evaluate a += b:

a = a + b = 6 + 2 = 8.
Now, a = 8.
        b. Then, evaluate b -= a:

b = b - a = 2 - 8 = -6.

Now, b = -6.

   c. Finally, evaluate a *= b:

a = a * b = 8 * (-6) = -48.

Now, a = -48.

 3. **Final values**:

   a. a = -48, b = -6.

Output:

```diff
Copy code
-48 -6
```

Question 15:

Find the output of the following program and provide proper parenthesization of the expression:

```c
Copy code
#include<stdio.h>
int main()
{
    int x = 4, y = 7, z = 3;
    x += y-- * ++z;
    printf("%d %d %d\n", x, y, z);
    return 0;
}
```

Solution:

 1. **Initial values**:

   a. x = 4, y = 7, z = 3

 2. **Parenthesization and evaluation**:

   a. First, evaluate ++z:

z = z + 1 = 4.

Now, z = 4.

      b. Then, evaluate y--:

y = 7 (used as is, and then decremented to 6).

      c. Now, evaluate the expression:

x += y-- * ++z = 4 + 7 * 4 = 4 + 28 = 32.

      d. Now, x = 32, y = 6, z = 4.

  3. **Final values**:

      a. x = 32, y = 6, z = 4.

Output:

Copy code

32 6 4

Question 16:

Find the output of the following program and provide proper parenthesization of the expression:

c
Copy code

```c
#include<stdio.h>
int main()
{
    int a = 3, b = 9;
    a += b -= a *= b;
    printf("%d %d\n", a, b);
    return 0;
}
```

Solution:

  1. **Initial values**:

      a. a = 3, b = 9

  2. **Parenthesization and evaluation**:

      a. First, evaluate a *= b:

a = a * b = 3 * 9 = 27.

Now, a = 27 and b = 9.

b. Then, evaluate b -= a:

b = b - a = 9 - 27 = -18.

Now, b = -18.

  c. Finally, evaluate a += b:

a = a + b = 27 + (-18) = 9.

Now, a = 9.

3. **Final values**:
     a. a = 9, b = -18.

Output:

Copy code

9 -18

Question 17:

Find the output of the following program and provide proper parenthesization of the expression:

c

Copy code

```
#include<stdio.h>
int main()
{
    int i = 5, j = 10, k = 3;
    i += j -= k *= i;
    printf("%d %d %d\n", i, j, k);
    return 0;
}
```

Solution:

1. **Initial values**:
     a. i = 5, j = 10, k = 3
2. **Parenthesization and evaluation**:
     a. First, evaluate k *= i:

```
k = k * i = 3 * 5 = 15.
```
Now, k = 15.

   b. Then, evaluate j -= k:
```
j = j - k = 10 - 15 = -5.
```
Now, j = -5.

   c. Finally, evaluate i += j:
```
i = i + j = 5 + (-5) = 0.
```
Now, i = 0.

3. **Final values**:
   a. i = 0, j = -5, k = 15.

Output:

Copy code
```
0 -5 15
```

Question 18:

Find the output of the following program and provide proper parenthesization of the expression:

c
Copy code
```c
#include<stdio.h>
int main()
{
    int x = 10, y = 2;
    x /= y += x %= y;
    printf("%d %d\n", x, y);
    return 0;
}
```

Solution:

1. **Initial values**:
   a. x = 10, y = 2

2. **Parenthesization and evaluation**:
   a. First, evaluate x %= y:

x = x % y = 10 % 2 = 0.
Now, x = 0 and y = 2.
   b. Then, evaluate y += x:

y = y + x = 2 + 0 = 2.
Now, y = 2.
   c. Finally, evaluate x /= y:

x = x / y = 0 / 2 = 0.
Now, x = 0.

3. **Final values**:
   a. x = 0, y = 2.

Output:

Copy code
0 2

Question 19:

Find the output of the following program and provide proper parenthesization of the expression:

c
Copy code
```c
#include<stdio.h>
int main()
{
    int a = 4, b = 6;
    a -= b += a *= b;
    printf("%d %d\n", a, b);
    return 0;
}
```

Solution:

1. **Initial values**:
    a. a = 4, b = 6
2. **Parenthesization and evaluation**:
    a. First, evaluate a *= b:

a = a * b = 4 * 6 = 24.

Now, a = 24 and b = 6.

    b. Then, evaluate b += a:

b = b + a = 6 + 24 = 30.

Now, b = 30.

    c. Finally, evaluate a -= b:

a = a - b = 24 - 30 = -6.

Now, a = -6.

3. **Final values**:
    a. a = -6, b = 30.

Output:

diff
Copy code
-6 30

Question 20:

Find the output of the following program and provide proper parenthesization of the expression:

c
Copy code
```c
#include<stdio.h>
int main()
{
    int p = 7, q = 3;
    p += q -= p *= q;
    printf("%d %d\n", p, q);
    return 0;
}
```

Solution:

1. **Initial values**:
   a. p = 7, q = 3
2. **Parenthesization and evaluation**:
   a. First, evaluate p *= q:

p = p * q = 7 * 3 = 21.
Now, p = 21 and q = 3.

   b. Then, evaluate q -= p:

q = q - p = 3 - 21 = -18.
Now, q = -18.

   c. Finally, evaluate p += q:

p = p + q = 21 + (-18) = 3.
Now, p = 3.

3. **Final values**:
   a. p = 3, q = -18.

Output:

Copy code
3 -18

Question 21:

Find the output of the following program and provide proper parenthesization of the expression:

c
Copy code
```c
#include<stdio.h>
int main()
{
    int a = 8, b = 4;
    a *= b += a -= b;
    printf("%d %d\n", a, b);
    return 0;
```

```
}
```

Solution:

1. **Initial values**:
    a. a = 8, b = 4
2. **Parenthesization and evaluation**:
    a. First, evaluate a -= b:

a = a - b = 8 - 4 = 4.

Now, a = 4 and b = 4.

    b. Then, evaluate b += a:

b = b + a = 4 + 4 = 8.

Now, b = 8.

    c. Finally, evaluate a *= b:

a = a * b = 4 * 8 = 32.

Now, a = 32.

3. **Final values**:
    a. a = 32, b = 8.

Output:

Copy code
32 8

Question 22:

Find the output of the following program and provide proper parenthesization of the expression:

c
Copy code
```c
#include<stdio.h>
int main()
{
    int x = 5, y = 7;
    x += y -= x *= y;
```

```c
    printf("%d %d\n", x, y);
    return 0;
}
```

Solution:

1. **Initial values**:
   a. $x = 5$, $y = 7$
2. **Parenthesization and evaluation**:
   a. First, evaluate $x *= y$:

$x = x * y = 5 * 7 = 35$.

Now, $x = 35$ and $y = 7$.

   b. Then, evaluate $y -= x$:

$y = y - x = 7 - 35 = -28$.

Now, $y = -28$.

   c. Finally, evaluate $x += y$:

$x = x + y = 35 + (-28) = 7$.

Now, $x = 7$.

3. **Final values**:
   a. $x = 7$, $y = -28$.

Output:

```
Copy code
7 -28
```