

Nama : Anang Nugraha

NIM : 09021381722106

KELAS : TIBIL5B

$$F_2 = \frac{1}{4} \sum_{x=0}^3 f_x e^{-i.2.2px/4} = \frac{1}{4} (f_0 e^0 + f_1 e^{-ip} + f_2 e^{-i2p} + f_3 e^{-i3p})$$


$$= \frac{1}{4} (2 + 3[\cos(p) - i \sin(p)] + 4[\cos(2p) - i \sin(2p)] + 4[\cos(3p) - i \sin(3p)])$$

$$= \frac{1}{4} (2 + 3[-1 - 0] + 4[1 - 0] + 4[-1 - 0]) = \frac{1}{4} (2 - 3 + 4 - 4) = \frac{1}{4} (-1) = -\frac{1}{4}$$

$$F_3 = \frac{1}{4} \sum_{x=0}^3 f_x e^{-i.3.2px/4} = \frac{1}{4} (f_0 e^0 + f_1 e^{-i3p/2} + f_2 e^{-i3p} + f_3 e^{-i9p/2})$$

$$= \frac{1}{4} (2 + 3[\cos(3p/2) - i \sin(3p/2)] + 4[\cos(3p) - i \sin(3p)] + 4[\cos(9p/2) - i \sin(9p/2)])$$

$$= \frac{1}{4} (2 + 3[0 + i] + 4[-1 - 0] + 4[0 - i]) = \frac{1}{4} (2 + 3i - 4 - 4i) = \frac{1}{4} (-2 - i) = -\frac{1}{4} (2 + i)$$



```
1. package citra_tfd;
2.
3. import java.util.Arrays;
4. public class Citra_tfd {
5.     public static void main(String[] args) {
6.         int N = 4;
7.         int f1[] = {2, 3, 4, 4};
8.         double a1[] = new double[N];
9.         double aR[] = new double[N];
10.        double afbilimag[] = new double[N];
11.        double afreal[] = new double[N];
12.        //print f
13.        System.out.println(Arrays.toString(f1));
14.        tfd(N, f1, aR, a1);
```

```

15. //printarrayR-I
16. System.out.println(Arrays.toString(aR));
17. System.out.println(Arrays.toString(aI));
18. tfd_b(N, aR, aI, afreal, afbilimag);
19. //printarrayrealdanimag
20. System.out.println(Arrays.toString(afreal));
21. System.out.println(Arrays.toString(afbilimag));
22. }
23.
24. public static void tfd (int N, int f[], double R[], double I[]) {
25.     int i, k;
26.     double tetha;
27.     for (i = 0; i < N; i++) {
28.         R[i] = 0.0;
29.         I[i] = 0.0;
30.     }
31.     for (k = 0; k < N; k++) {
32.         for (i = 0; i < N; i++) {
33.             tetha = k * 2 * 3.14 * i / (double) N;
34.             R[k] = R[k] + (f[i] * Math.cos(tetha)) / (double) N;
35.             I[k] = I[k] - (f[i] * Math.sin(tetha)) / (double) N;
36.         }
37.     }
38. }
39.
40. public static void tfd_b (int N, double R[], double I[], double fReal[], double fImag[]) {
41.     int j, k;
42.     double tet, eps = 1E-12;
43.     for (j = 0; j < N; j++) {
44.         fReal[j] = 0.0;
45.         fImag[j] = 0.0;
46.     }
47.     for (k = 0; k < N; k++) {
48.         for (j = 0; j < N; j++) {
49.             tet = k * 2 * 3.14 * j / (double) N;
50.             fReal[k] = fReal[k] + (R[j] * Math.cos(tet) - I[j] * Math.sin(tet));
51.             fImag[k] = fImag[k] + (I[j] * Math.cos(tet) + R[j] * Math.sin(tet));
52.         }
53.         if (fImag[k] < eps) {
54.             fImag[k] = 0;
55.         }
56.     }
57. }
58.

```

59.

60. \

Screen Shot :

The screenshot shows the NetBeans IDE interface. The main editor window displays the source code of a Java program named `Citra_tfd.java`. The code is as follows:

```
6  *
7  * @author AnangNugraha
8  */
9
10 public class Citra_tfd {
11     public static void main(String[] args) {
12         int N = 4;
13         int f1[] = {2, 3, 4, 4};
14         double aI[] = new double[N];
15         double aR[] = new double[N];
16         double afbllimag[] = new double[N];
17         double afreal[] = new double[N];
18         //print f
19         System.out.println(Arrays.toString(f1));
20         tfd(N, f1, aR, aI);
21         //printarrayR-I
```

The output window shows the results of the program execution:

```
run:
[2, 3, 4, 4]
[3.25, -0.5017904648067711, -0.24999270744943747, -0.49461343935218416]
[0.0, 0.24840473127235518, -0.002787130484355642, -0.25475440038651886]
[2.0036033883916073, 2.997620534925046, 3.9972188843334346, 4.000808982144792]
[0.0, 0.0, 0.001193849491587351, 0.00636171664050722]
BUILD SUCCESSFUL (total time: 0 seconds)
```