LAPORAN QUIZ 4
EL 2008 PENYELESAIAN MASALAH DENGAN C
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1. Penurunan Persamaan
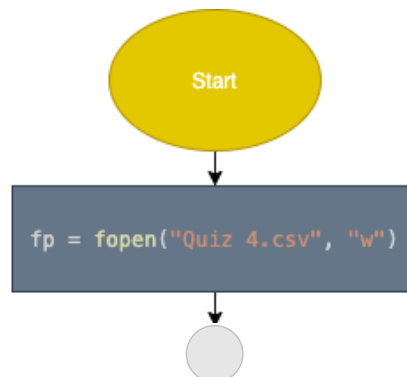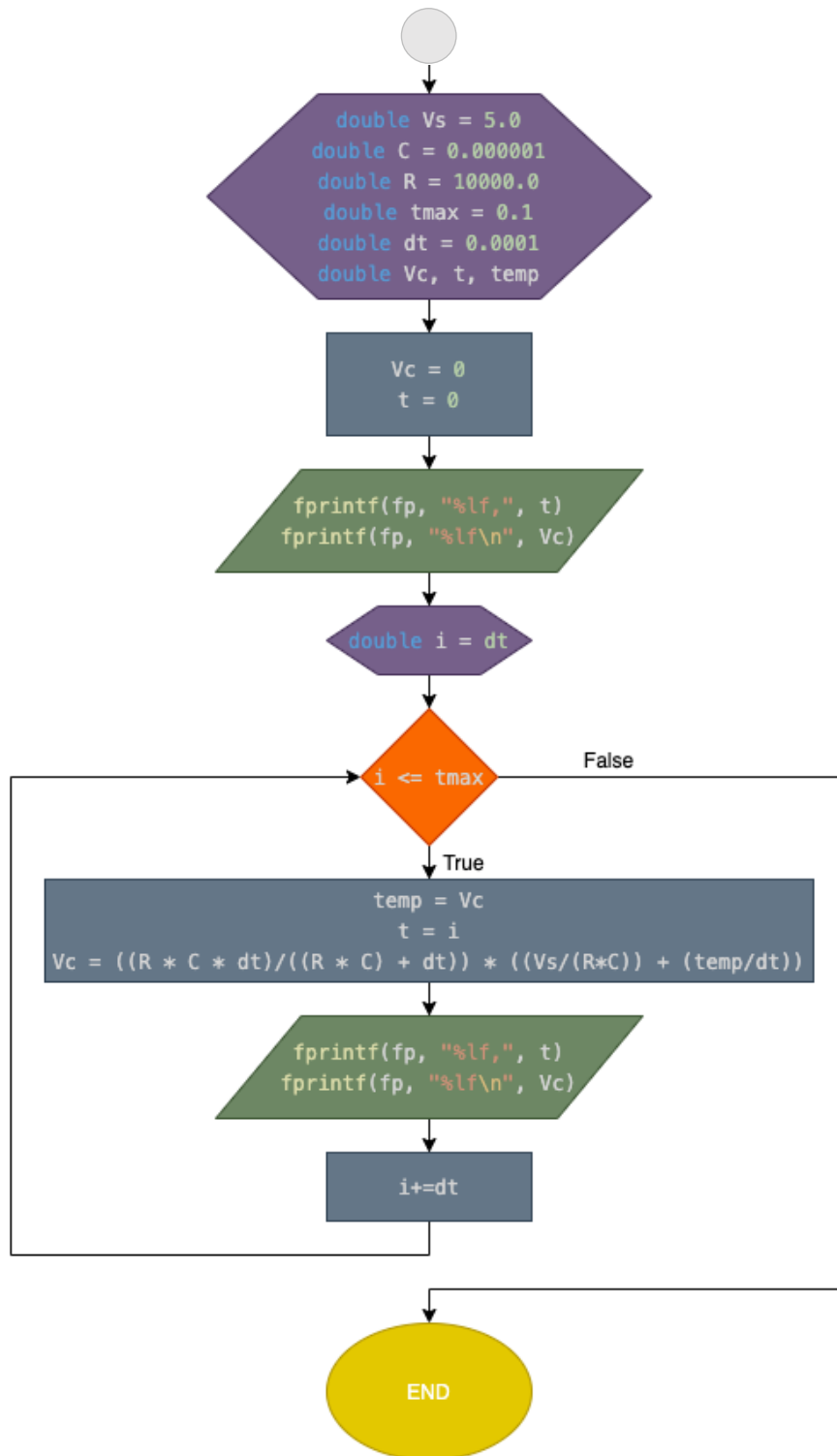

Dengan Analisis Mesh: $V_S = V_R + V_O$

$$V_S = i(t) \cdot R + V_O \quad ; \quad i(t) = C \cdot \frac{dV_O(t)}{dt}$$

$$V_S = C \cdot R \cdot \frac{dV_O(t)}{dt} + V_O(t)$$

$$\frac{V_S}{CR} = \frac{dV_O(t)}{dt} + \frac{1}{RC} \cdot V_O(t) \quad \dots (1)$$

Definisi Turunan: $\dfrac{dV_O(t)}{dt} = \lim_{\Delta t \to 0} \dfrac{V_O(t) - V_O(t - \Delta t)}{\Delta t}$

hilangkan limit dan $\Delta t \propto dt$.

$$\frac{dV_O(t)}{dt} = \frac{V_O(t) - V_O(t - dt)}{dt} \quad \dots (2)$$

Substitusi (2) ke (1): $\dfrac{V_S}{CR} = \dfrac{V_O(t)}{dt} - \dfrac{V_O(t - dt)}{dt} + \dfrac{1}{RC} V_O(t)$

$$\left(\frac{1}{dt} + \frac{1}{RC} \right) V_O(t) = \frac{V_S}{RC} + \frac{V_O(t - dt)}{dt}$$

$$\boxed{V_O(t) = \left(\frac{dt\, RC}{dt + RC} \right) \cdot \left(\frac{V_S}{RC} + \frac{V_O(t - dt)}{dt} \right)}$$

2. Flowchart


```
fp = fopen("Quiz 4.csv", "w")
```

```
double Vs = 5.0
double C = 0.000001
double R = 10000.0
double tmax = 0.1
double dt = 0.0001
double Vc, t, temp
```

```
Vc = 0
t = 0
```

```
fprintf(fp, "%lf,", t)
fprintf(fp, "%lf\n", Vc)
```

```
double i = dt
```

i <= tmax

False

True

```
temp = Vc
t = i
Vc = ((R * C * dt)/((R * C) + dt)) * ((Vs/(R*C)) + (temp/dt))
```

```
fprintf(fp, "%lf,", t)
fprintf(fp, "%lf\n", Vc)
```

```
i+=dt
```

END

3. Kode

```c
#include <stdio.h>
int main() {
    // inisiasi file
    FILE *fp;
    fp = fopen("Quiz 4.csv", "w");                      // open or create csv file

    // inisiasi variabel
    double Vs = 5.0;
    double C = 0.000001;
    double R = 10000.0;
    double tmax = 0.1;
    double dt = 0.0001;
    double Vc, t, temp;

    // Hitung Vc
    Vc = 0;                                              // Vc awal diketahui 0
    t = 0;
    fprintf(fp, "%lf,", t);                             // input data ke file external
    fprintf(fp, "%lf\n", Vc);
    for(double i = dt; i < = tmax; i += dt) {//looping dari t=dt sampai t=tmax
        temp = Vc;                                       // menyimpan data Vc(t-dt)
        t = i;                                           // menyimpan data t
        Vc=((R*C*dt)/((R*C)+dt))*((Vs/(R*C))+(temp/dt));    // perhitungan Vc
        fprintf(fp, "%lf,", t);                          // input data ke file
        fprintf(fp, "%lf\n", Vc);
    }
    fclose(fp);                                          // menutup file
    return(0);
}
```

4. Grafik Hasil

Vc(t)