NUMERICAL METHODS - Lab 3

Task 1

```
for i = 1:3:3*5
    i
end
```

```
i = 1
i = 4
i = 7
i = 10
i = 13
```

Task 2

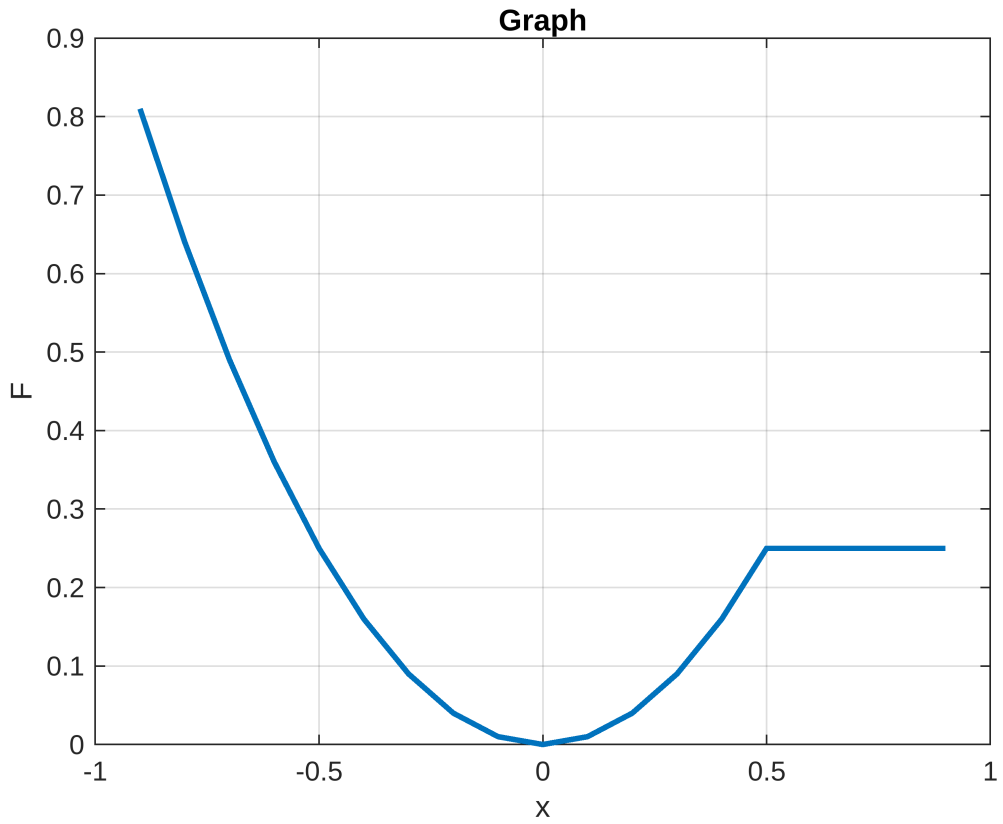
```
% Define the range of x values
x_values = -1:0.1:1;

% Initialize an array for values of F
F_values = zeros(size(x_values));

% Iterate through each value of x
for i = 1:length(x_values)
    x = x_values(i);

    if -1 < x && x < 0.5
        F_values(i) = x^2;
    elseif 0.5 <= x && x < 1
        F_values(i) = 0.25;
    else
        F_values(i) = NaN;
    end
end

% Plot the graph
plot(x_values, F_values, 'LineWidth', 2);
title('Graph');
xlabel('x');
ylabel('F');
grid on;
```



Task 3

Find the Taylor polynomial near x= 1 for f(x) = lnx.

```
syms x;
f = log(x);
taylor_poly = taylor(f, x, 'ExpansionPoint', 1, 'Order', 3);
disp(taylor_poly);
```

$$x - \frac{(x-1)^2}{2} - 1$$

For the Taylor polynomials of orders 1, 3, and 5 near x=0 for $f(x)$=sin(x):

```
syms x;
f = sin(x);
taylor_poly_1 = taylor(f, x, 'ExpansionPoint', 0, 'Order', 1);
taylor_poly_3 = taylor(f, x, 'ExpansionPoint', 0, 'Order', 3);
taylor_poly_5 = taylor(f, x, 'ExpansionPoint', 0, 'Order', 5);

disp(taylor_poly_1);
```

$$0$$

```
disp(taylor_poly_3);
```

x

```
disp(taylor_poly_5);
```

$$x - \frac{x^3}{6}$$