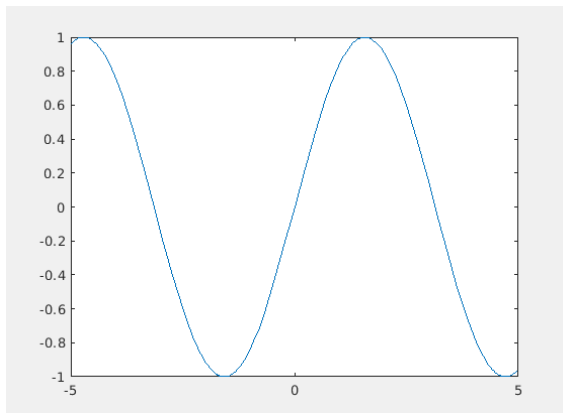


Lab 1 Report

Exercises:

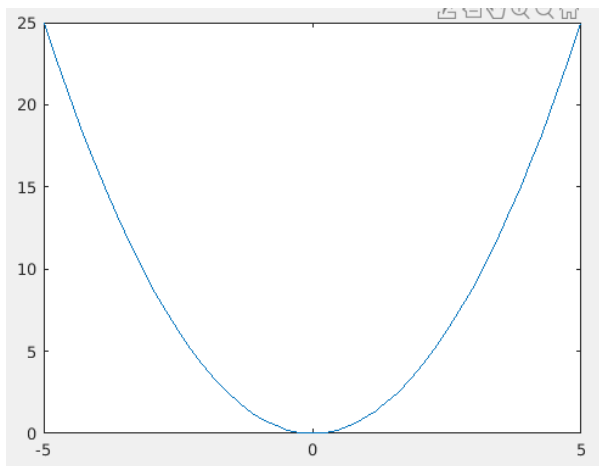
1. Give two examples of nonlinear equations of the type $f(x) = 0$. Plot them. If possible, find an interval that brackets a root.

Example 1: $f(x) = \sin(x)$



Interval = 0 to π .

Example 2: $f(x) = x^2$



Interval = -1 to 1

2. Give an example of a nonlinear equation with (a) three roots, and (b) zero roots.

Example a: $f(x) = (x-1)(x-2)(x-3)$

Example b: $f(x) = x^2 + 1$

Computer Lab: Bisection Method

```
[xst, erra, iter] = bisection(@f, 0, 1, .001);
```

```
function value = f(x)
value = tan(x) - 1/(1+x^2);
end
```

```
function [xst, erra, iter] = bisection(func,a,b,tol)
if func(a)*func(b) > 0
    error('Invalid choice of a and b');
end
iter = 0;
while abs(b - a) >= .0001
    xrold = (a + b)/2;
    x = func(a)*func(xrold);
    if x < 0
        b = xrold;
        iter = iter + 1;
    elseif x > 0
        a = xrold;
        iter = iter + 1;
    else
        xst = xrold;
        iter = iter + 1;
        return;
    end
    xr = (a+b)/2;
end
xst = xr;
erra = 100 * abs((xr - xrold)/xr);
end
```

Output: xst = .6239, erra = .0049, iter = 14