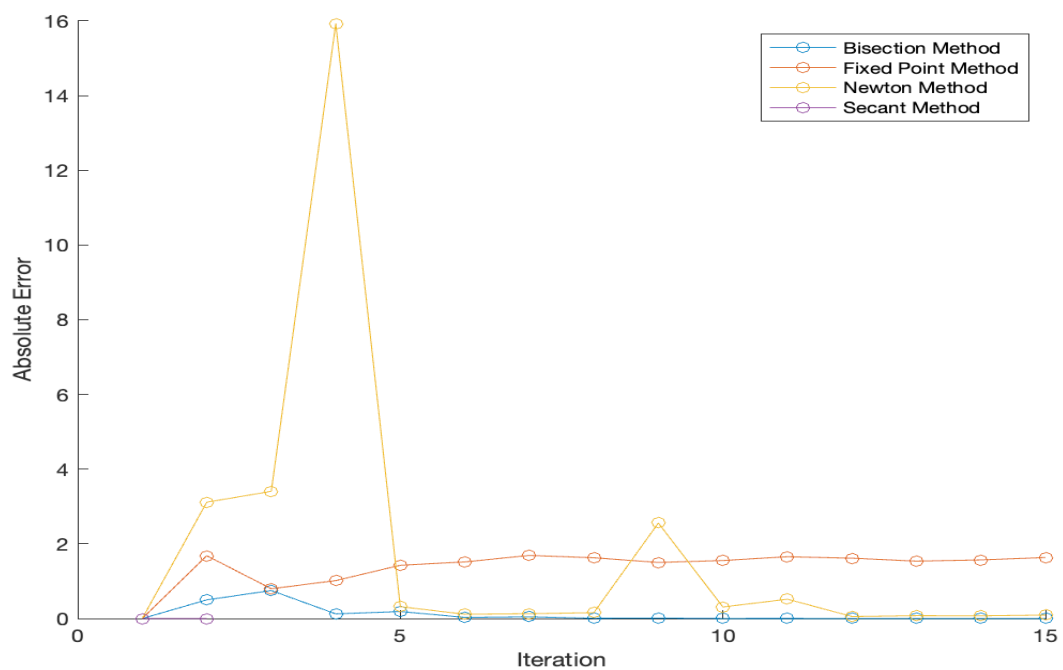


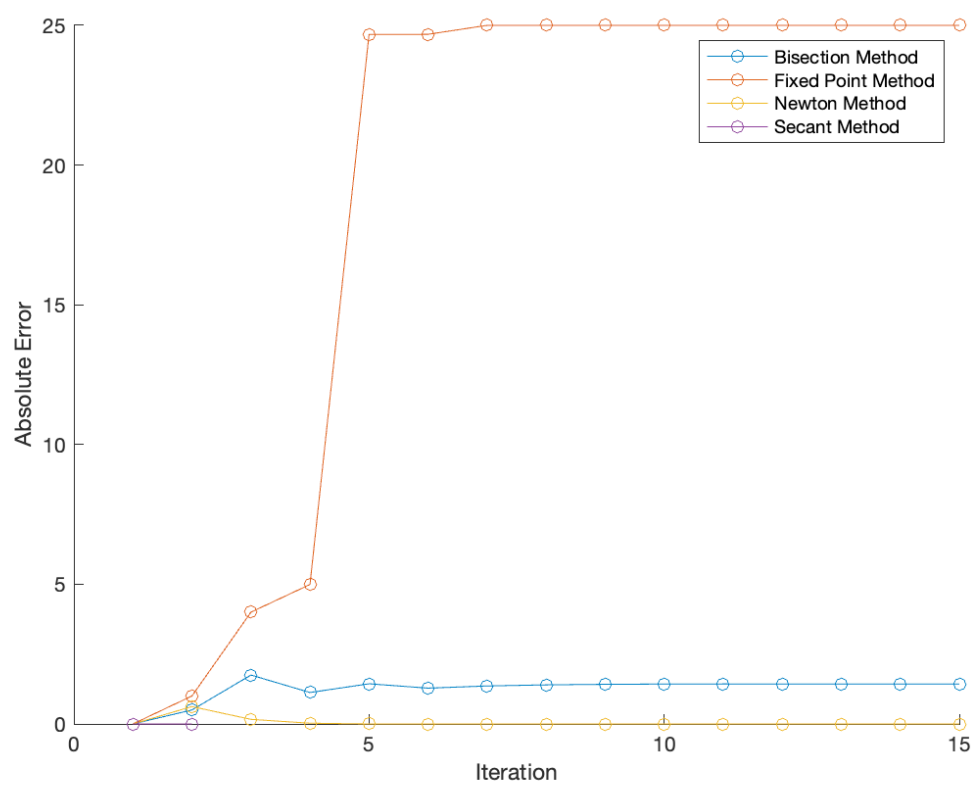
The given report presents Code for the different root finding methods and the result of absolute error of those methods.

Given graph given below shows number of iteration and absolute error for the function $f(x) = \frac{1}{2} \sin(x-1)^2$

Form the given two graph we can say that newtons methods approximate solution quicker than bisection method. Secant method is most accurate method for finding the solutions.



The Given graph below shows number of iteration and absolute error for the function $f(x) = 5^{(-x)} - 2$



%Code for bisection method

```
function [p, errBS] = Bisection2(f, a, b, maxIt)
p = zeros(1, maxIt);
errBS = zeros(1, maxIt);
for i = 2:maxIt
p(i) = (a + b) / 2;
if f(p(i)) == 0
break;
elseif f(p(i)) * f(a) < 0
b = p(i);
else
a = p(i);
end
errBS(i) = abs(p(i) - 1);
end
end
```

%Code for fixed-point method

```
function [p, errFX] = fixedpoint2(f, x0, tol, maxIT)
p = zeros(1, maxIT);
errFX = zeros(1, maxIT);
for i = 2:maxIT
p(i) = f(p(i-1));
errFX(i) = abs(p(i) - p(i-1));
end
end
```

%Code for Newtons Method

```
function [p, errNM] = Newton2(f, df, x0, tol, maxIt)
p = zeros(1, maxIt);
errNM = zeros(1, maxIt);
for i = 2:maxIt
p(i) = p(i-1) - f(p(i-1)) / df(p(i-1));
errNM(i) = abs(p(i) - p(i-1));
err_Newton2 = errNM(i)
end
end
```

%Code for Secant method

```
function [p, errS] = Secant2(f, x0, x1, tol, maxIt)
p = zeros(1, maxIt);
errS = zeros(1, maxIt);
for i = 3:maxIt
p(i) = p(i-1) - f(p(i-1)) * (p(i-1) - p(i-2)) / (f(p(i-1)) - f(p(i-2)));
errS(i) = abs(p(i) - p(i-1));
end
end
```

```

%code to call the functions for  $f(x) = 5^{-x} - 2$  and  $f(x) = \frac{1}{2} \sin(x-1)^2$ 
a= 3
b= -2
x0 =45
x = [1,2]
f = @(x)5^(-x)-2
df = @(x)-log(5)/(5^x)
tol =0.0000067
maxIt = 15
x1 = 60
[p,errBS] = Bisection2(f,a,b,maxIt)
[p,errNM] = Newton2(f,df,x0,tol,maxIt)
[p,errFX] = fixedpoint2(f,x0,tol,maxIt)
[p,errS] = Secant2(f,x0,x1,tol,maxIt)
hold on;
plot(1:maxIt, errBS, '-o', 'DisplayName', 'Bisection Method');
plot(1:maxIt, errFX, '-o', 'DisplayName', 'Fixed Point Method');
plot(1:maxIt, errNM, '-o', 'DisplayName', 'Newton Method');
plot(1:maxIt, errS, '-o', 'DisplayName', 'Secant Method');
xlabel('Iteration');
ylabel('Absolute Error');
legend();
hold off;

```