We compute numerically the order of convergence the sequence $x_{n+1} = \cos(x_n)$.

```
format long
N = 20;
m = 10;
x = zeros(N+m,1); %initialize the first N+m terms of the sequence x_1,
x_2,..., x_(m+N)
x(1) = 0; %initial guess
for k = 1:(N+m-1)
    x(k+1) = g(x(k));
end
```

Define the errors $\epsilon_n = |x_n - x_*| \approx |x_n - x_{n-1}|$.

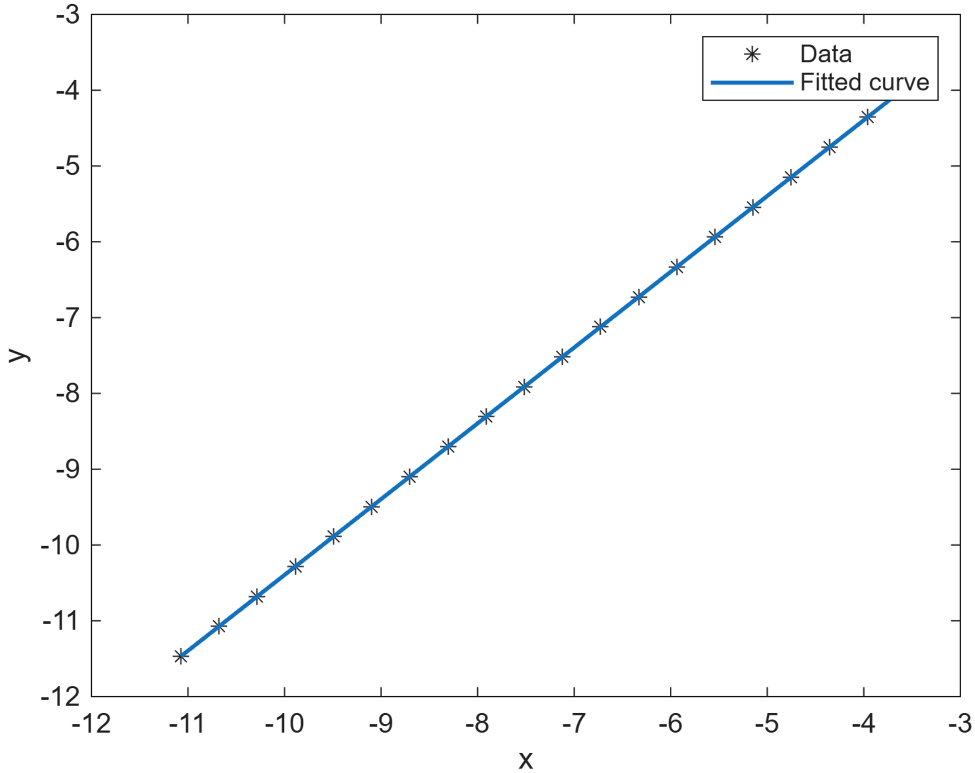
```
eps = zeros(N+m,1);
for k = 2:(N+m)
    eps(k) = abs(x(k) - x(k-1));
end
```

Make vector X and vector Y:

```
X = log(eps(m:(m+N-1)));
Y = log(eps((m+1):(m+N)));
f = fit(X,Y,'poly1')
```

```
f =
     Linear model Poly1:
     f(x) = p1*x + p2
     Coefficients (with 95% confidence bounds):
       p1 =      0.9999  (0.9997, 1)
       p2 =     -0.3958  (-0.3973, -0.3942)
```

```
plot(f,X,Y,'*')
```



Define function g for the fixed point problem $x = g(x)$:

```
function y = g(x)
    y = cos(x);
end
```