

MATLAB Section

The code used is as follows:

```
%%  
% File: hw5.m  
%  
% Author: Thomas Kost  
%  
% Date: 19 February 2021  
%  
% @brief homework 5 implementations  
%  
  
clear,clc,close all;  
%% 12.6 : equilizer  
  
c = [1,0.7,-0.3, -0.1, 0.05];  
n = size(c,2);  
T_c = convmtx(c,n)';  
I = eye(size(T_c,1));  
e1 = I(:,1);  
h = pinv(T_c)*e1;  
  
fig1 = figure(1);  
hold on;  
plot(c);  
plot(h);  
hold off;  
xlabel("index: n");  
ylabel("f(n)");  
legend("c","h");  
saveas(fig1, "c_and_h.jpg");  
fig2 = figure(2);  
plot(conv(h,c));  
xlabel("index: n");  
ylabel("f(n)");  
legend("c*h");  
saveas(fig2, "conv.jpg");  
  
%% 13.17: polynomial fitting  
x = linspace(-1,1,11);  
y = (1 + x)./(1 + 5*(x.^2));  
fig3 =figure(3);  
hold on;
```

```

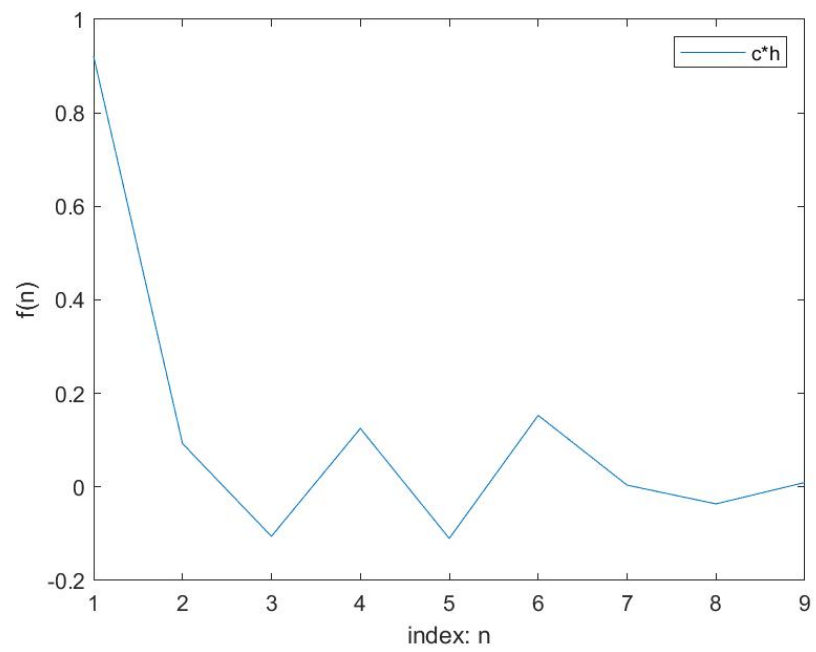
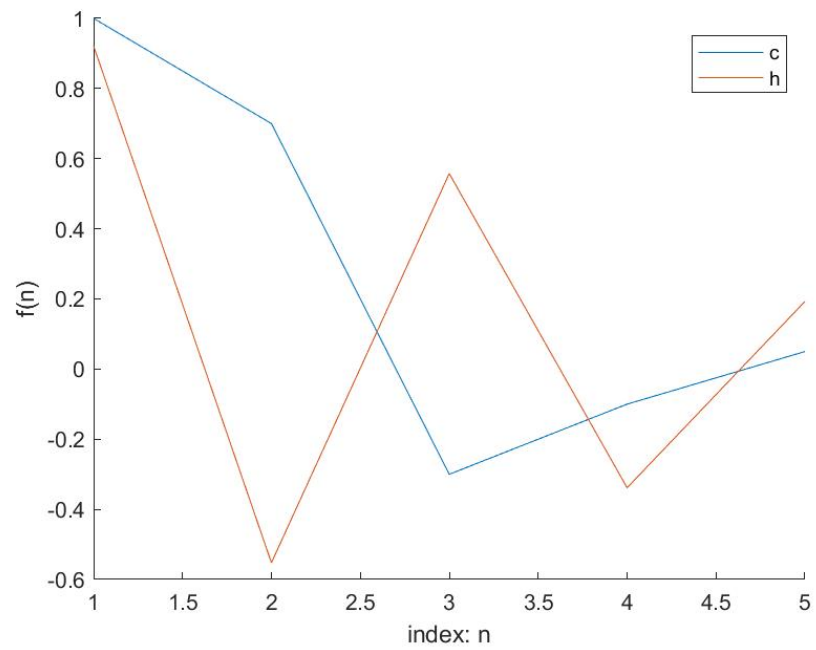
for i = 1:9
    A = fliplr(vander(x));
    A = A(:,1:i);
    theta = pinv(A)*y';
    t = linspace(-1,1,1000)';
    polynomial = 0;
    for m = 1:size(theta,1)
        polynomial = (t.^(m-1))*theta(m) + polynomial;
    end
    plot(t,polynomial);
end

t = linspace(-1.1,1.1,1000)';
y = (1 +t) ./ (1 + 5*t.^2);
plot(t,y);
hold off;
legend("deg0","deg1","deg2","deg3","deg4","deg5","deg6","deg7","deg8","true");
saveas(fig3,"poly_plot.jpg");

```

Results:

12.6:



13.17:

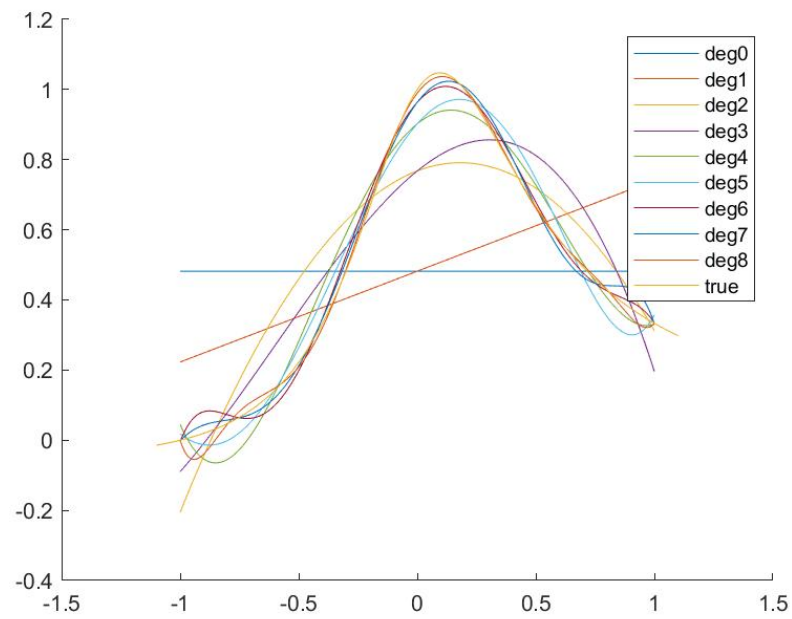


Figure 1: Fig3