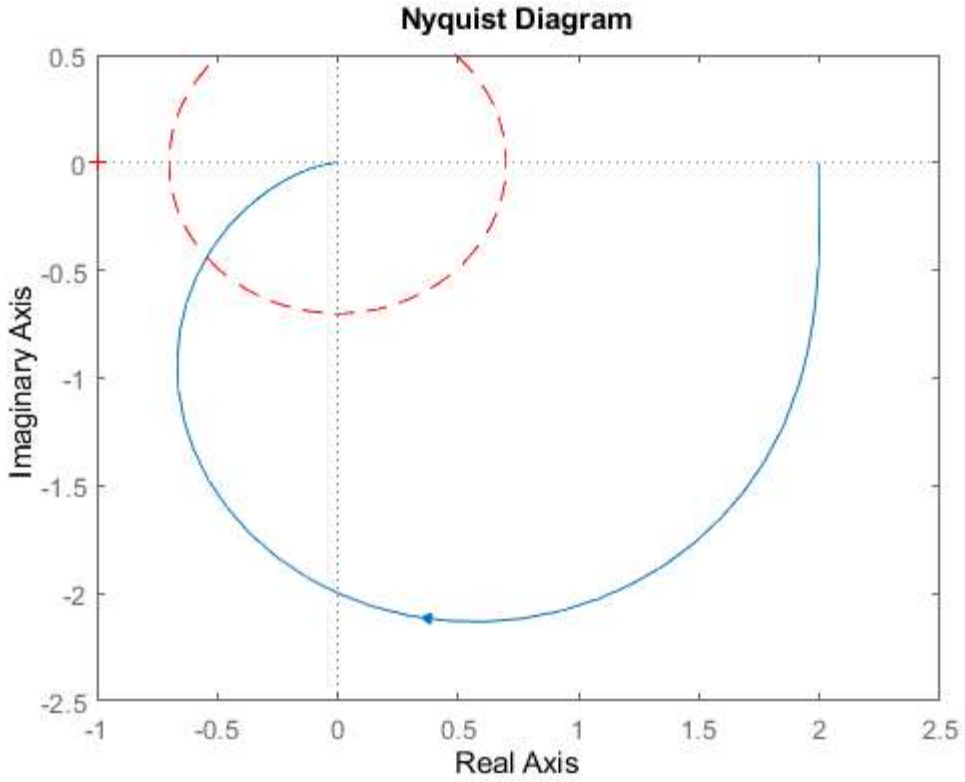
Contents

4.1 Problems: Nyquist diagrams

a) Defining the tf function and ploting a the coresponding nyqusit diagramm

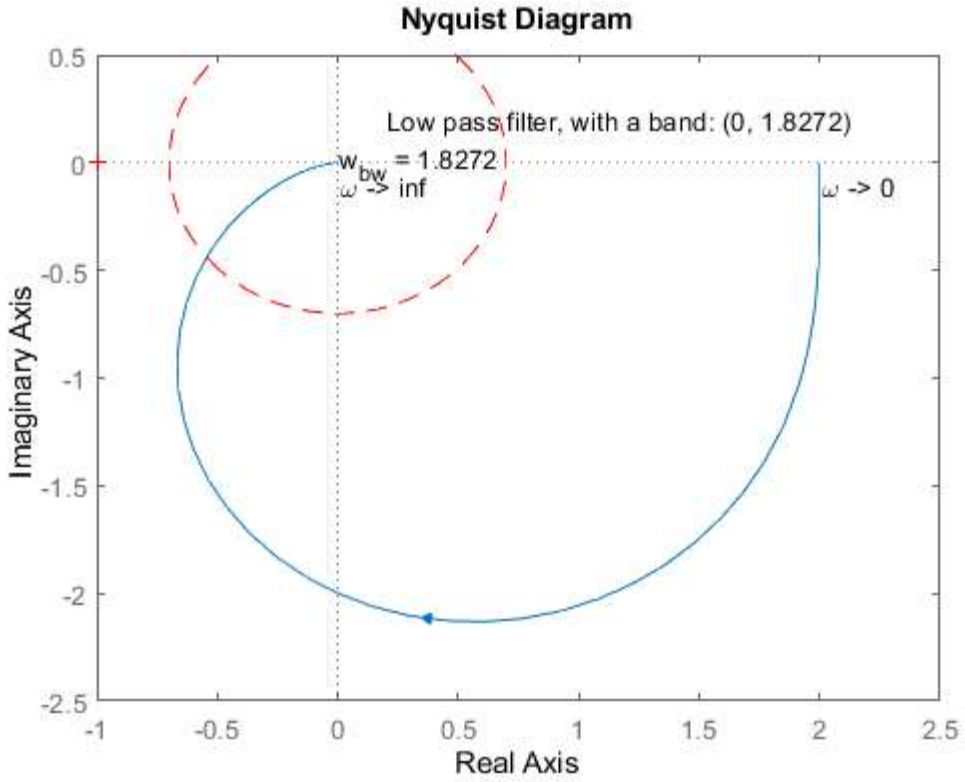
```
H = tf([2], [1 1 1]);
[re, im, wout] = nyquist(H);
p = nyquistplot(H);

% only showing the positive freq.
setoptions(p,'ShowFullContour','off');

% plot a red, dashed line unit (0.7) circle
hold;
x=0:0.1:2*pi;
plot(0.7*sin(x),0.7*cos(x),'--r');
shg;

% Calculating the band_with freq.
for i = 1:length(wout)
    if(sqrt(im(i)^2 + re(i)^2) < 0.73)
        if(sqrt(im(i)^2 + re(i)^2) > 0.65)
            w_bw = wout(i);
        end
    end
end
```

```
Current plot held
```



The frequencie regions

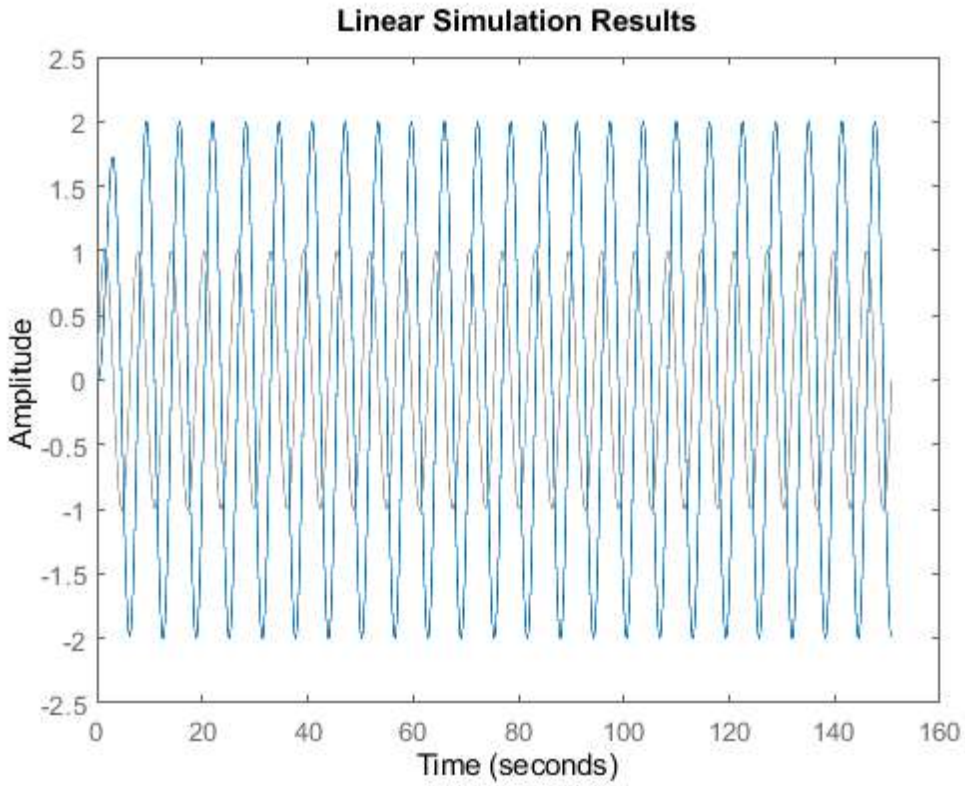
```
text(2.01, -0.1,'\omega -> 0');
text(0.01, -0.1,'\omega -> inf');
text(0,0,['w_b_w = ', num2str(w_bw)]);
text(0.2,0.2, ['Low pass filter, with a band: (0, ', num2str(w_bw), ')']);

shg;
```



Simulating a sinwave input with a 1rad/s freq.

the signal is amplified (obtained from the simulation)

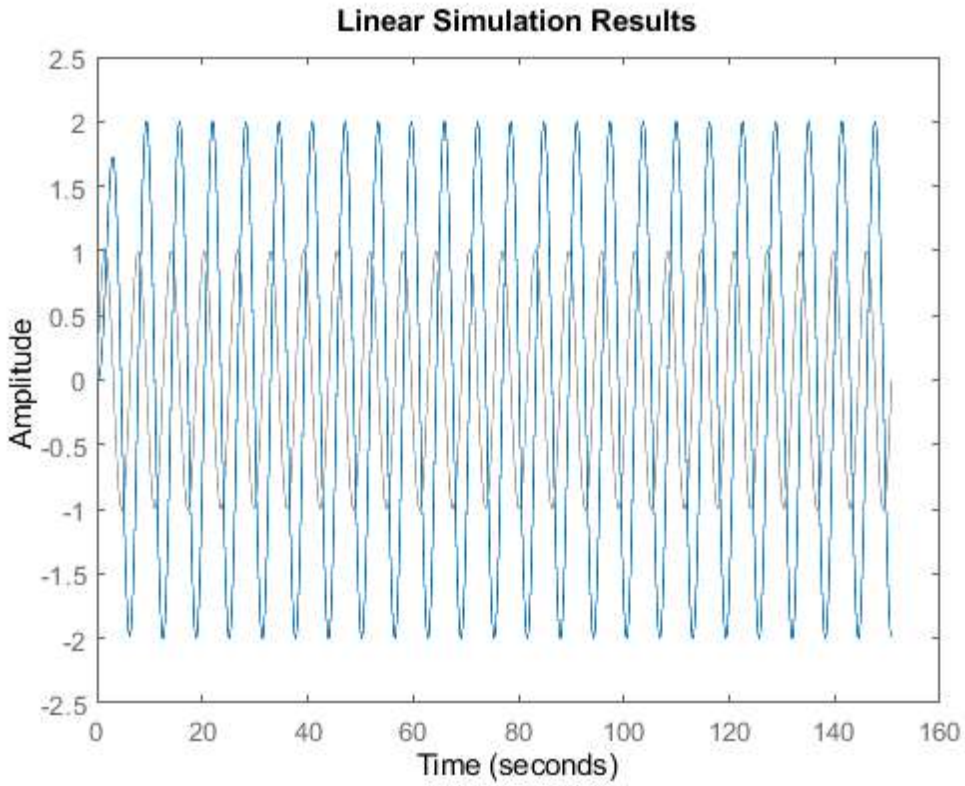
```
w = 1;
f = w/2/pi;
T = 1/f;
t = 0:0.01:24*T;
u = sin(w*t);

figure;
lsim(H, u,t);
shg;
```

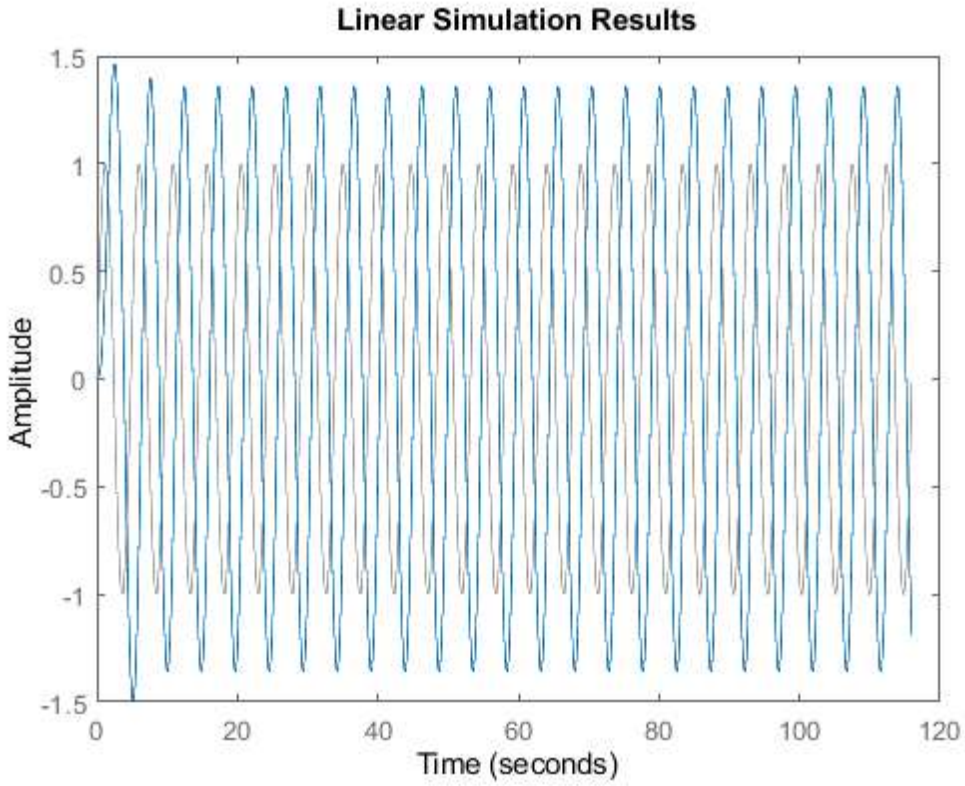


Simulating a sinwave input with a 1.3 rad/s freq.

the signal is amplified (obtained from the simulation)

```
w = 1.3;
f = w/2/pi;
T = 1/f;
t = 0:0.01:24*T;
u = sin(w*t);

figure;

lsim(H, u,t);
shg;
```



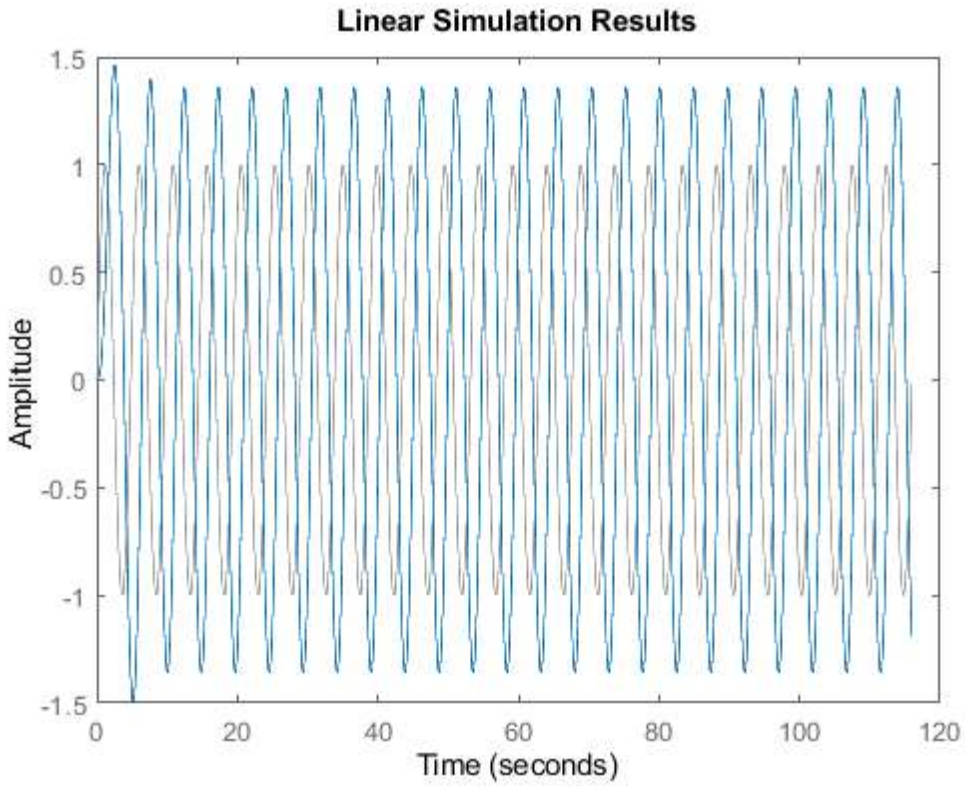


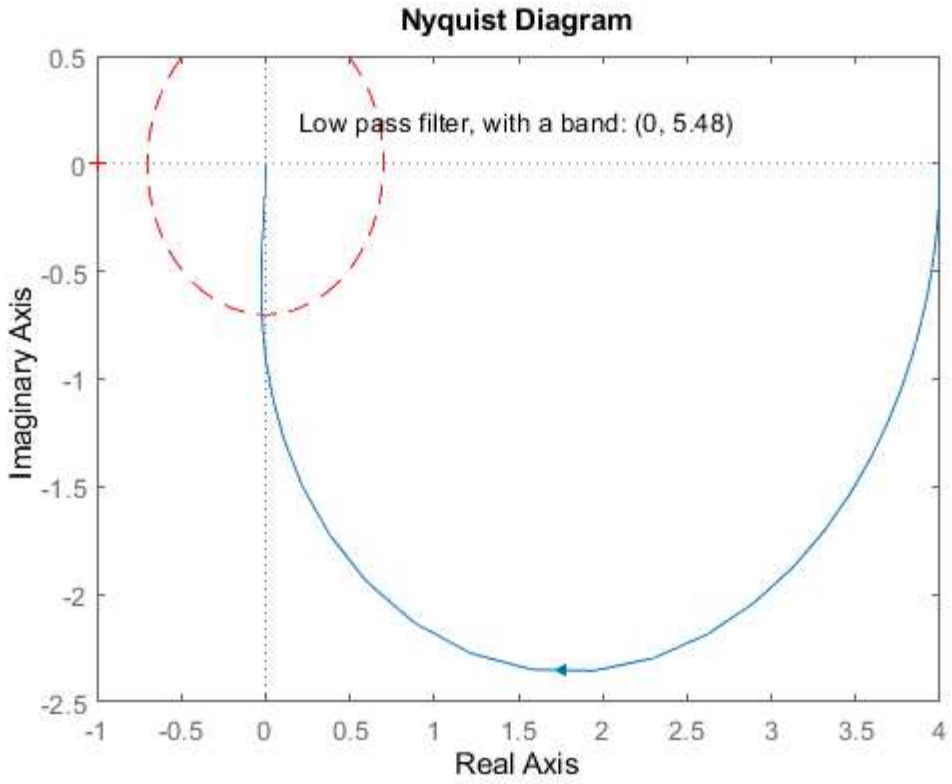
b)

Defining the tf function and ploting a the coresponding nyqusit diagramm

```
figure;
H = tf([1 4], [0.3 1 1]);
[re, im, wout] = nyquist(H);
p = nyquistplot(H);

% only showing the positive freq.
setoptions(p,'ShowFullContour','off');

% plot a red, dashed line unit (0.7) circle
hold;
x=0:0.1:2*pi;
plot(0.7*sin(x),0.7*cos(x),'--r');
shg;



text(0.2,0.2, 'Low pass filter, with a band: (0, 5.48)');

shg;
```

```
Current plot held
```

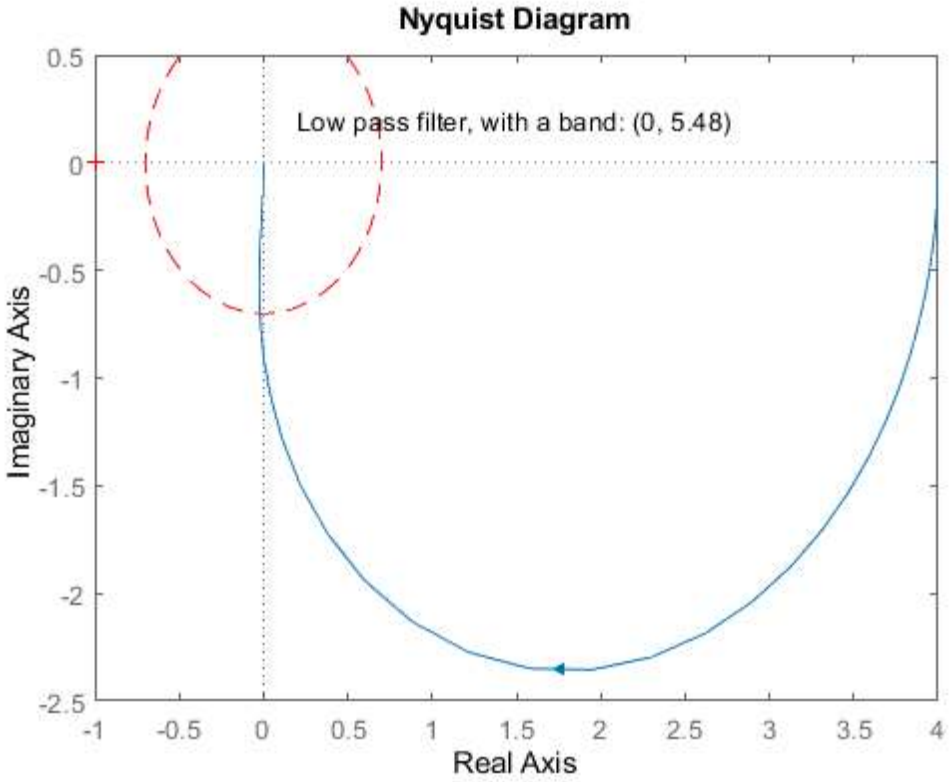


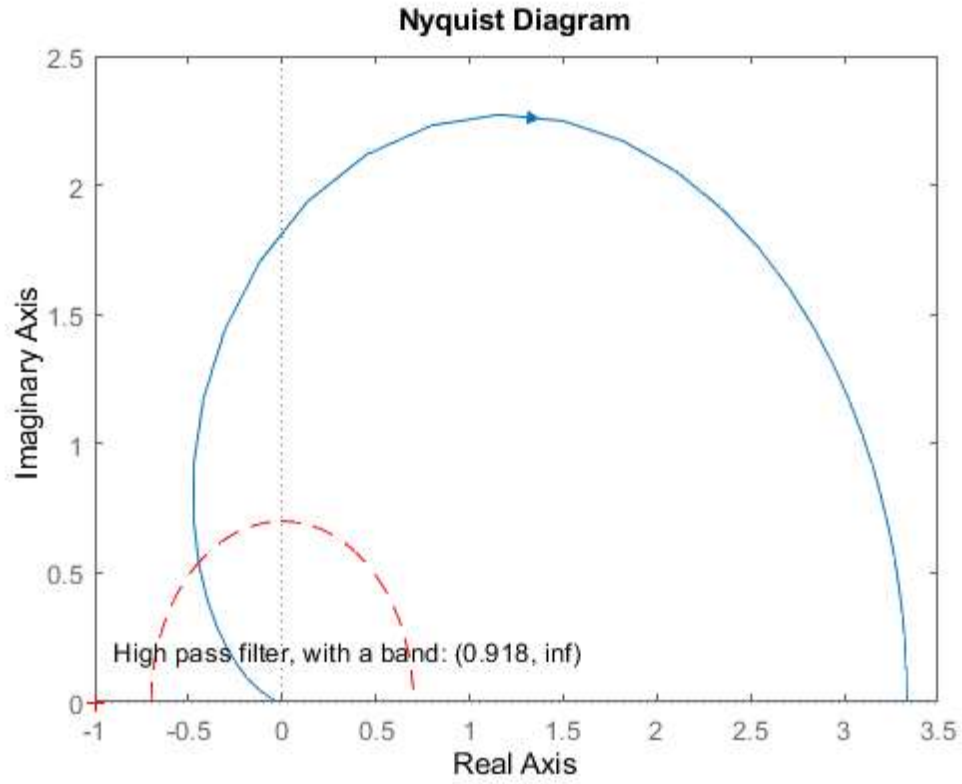


c)

Defining the tf function and ploting a the coresponding nyqusit diagramm

```
figure;
H = tf([1 0 0], [0.3 1 1]);
[re, im, wout] = nyquist(H);
p = nyquistplot(H);

% only showing the positive freq.
setoptions(p,'ShowFullContour','off');

% plot a red, dashed line unit (0.7) circle
hold on;
x=0:0.1:2*pi;
plot(0.7*sin(x),0.7*cos(x),'--r');
shg;


text(-0.9,0.2, 'High pass filter, with a band: (0.918, inf) ');

shg;
```



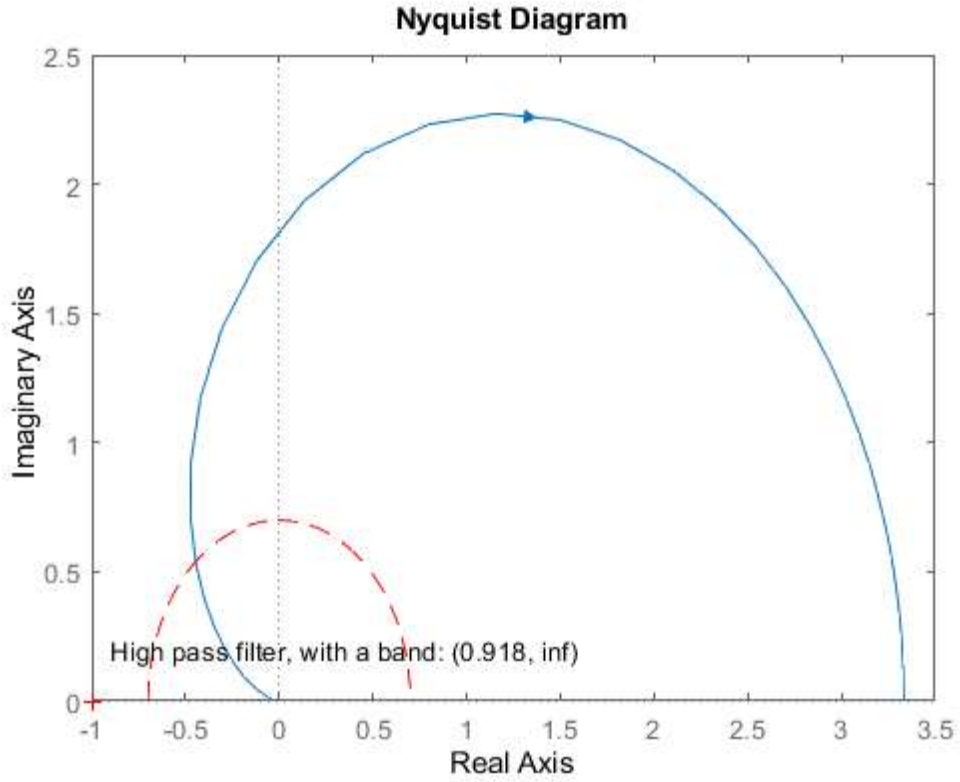


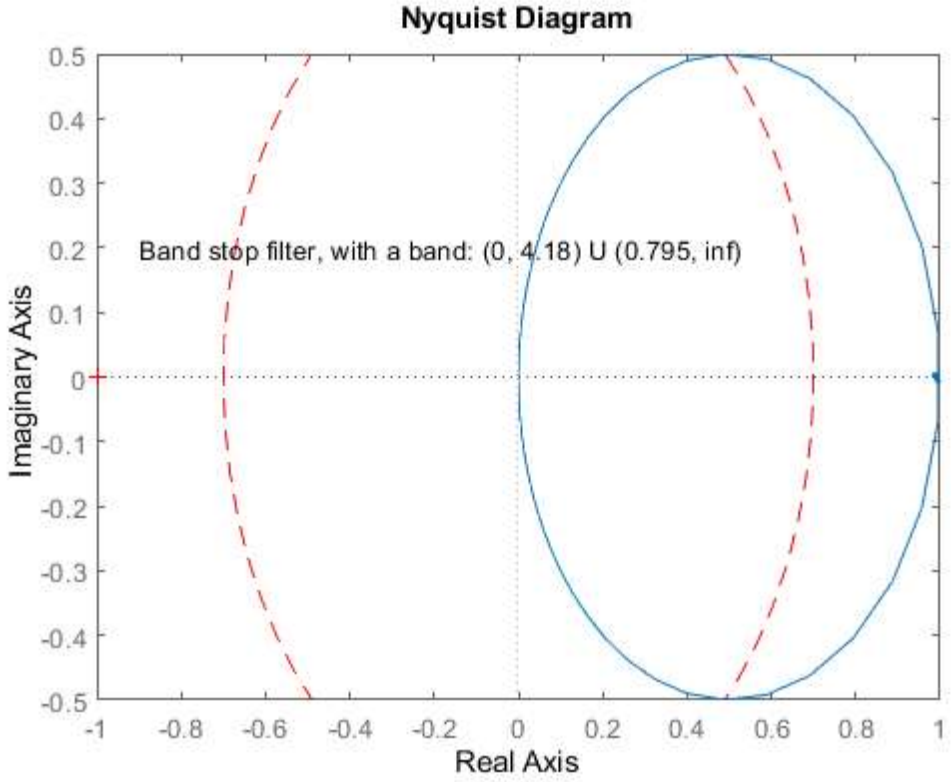
d)

Defining the tf function and ploting a the coresponding nyqusit diagramm

```
figure;
H = tf([1 0], [0.3 1 1]);
[re, im, wout] = nyquist(H);
p = nyquistplot(H);

% only showing the positive freq.
setoptions(p,'ShowFullContour','off');

% plot a red, dashed line unit (0.7) circle
hold;
x=0:0.1:2*pi;
plot(0.7*sin(x),0.7*cos(x),'--r');
shg;


text(-0.9,0.2, 'Band stop filter, with a band: (0, 4.18) U (0.795, inf) ');

shg;
```

```
Current plot held
```





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