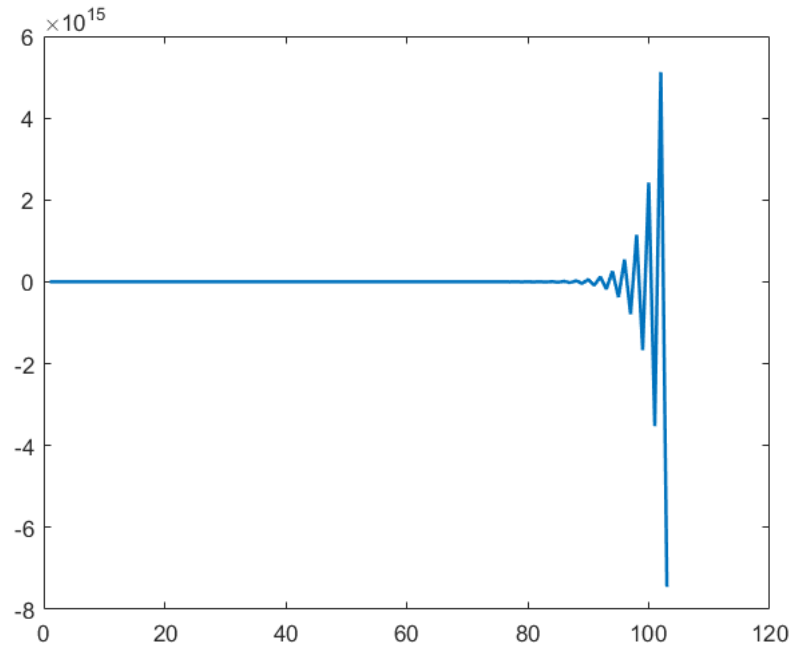


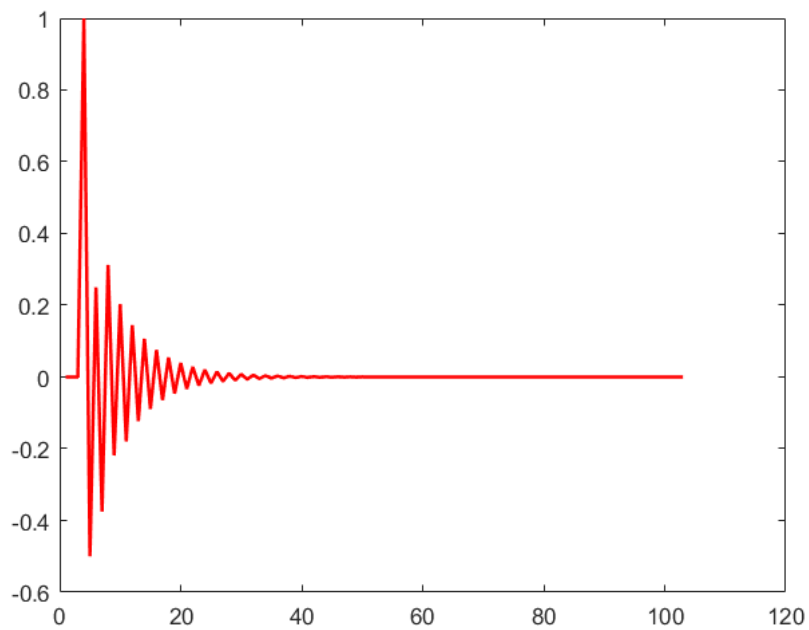
Activity 1

```
x = zeros(1,100);
```



```
x(1)=1;
r = 0.5;
w = pi/3;
y=[0,0,0];
for i=1:100
    new = x(i)+2*r*cos(4*w)*y(end)-r*r*y(end-2);
    y = [y ,new];
end

plot(y, 'r', 'LineWidth',1.5)
```

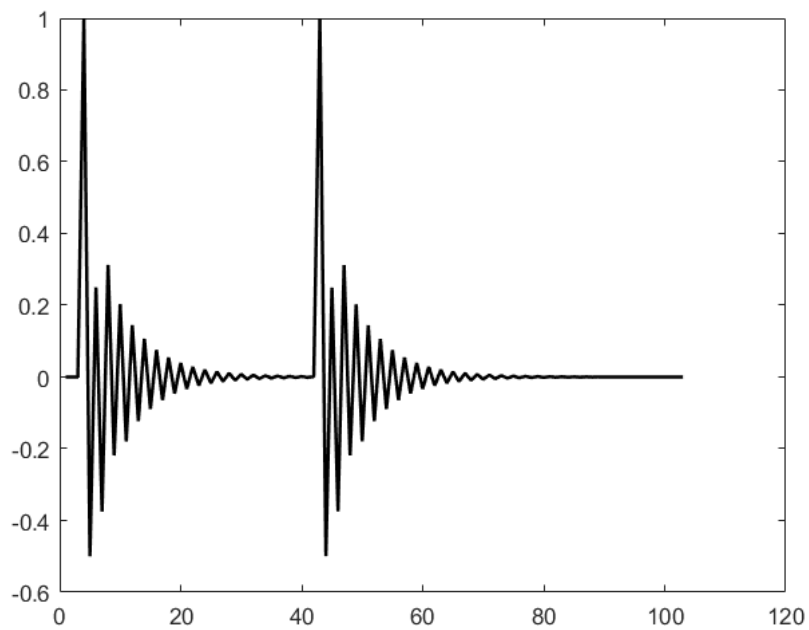


```

x = zeros(1,100);
x(1)=1;
x(40)=1;
r = 0.5;
w = pi/3;
y=[0,0,0];
for i=1:100
    new = x(i)+2*r*cos(4*w)*y(end)-(r^2)*y(end-2);
    y = [y ,new];
end

plot(y, 'k', 'LineWidth',1.5)

```



$$y[n] = b_0x[n] + b_1x[n-1] + \dots - a_1Y[n-1] - a_2Y[n-2] - \dots$$

$$a_0 = 1$$

$$b_0 = 1$$

$$a_1 = -2r \cos(\omega)$$

$$a_2 = r^2$$

$$y[n] = x[n] - 2r \cos(\omega)Y[n-1]$$

$$\text{Let } \omega = \frac{\pi}{2} \text{ and } r = 0.9$$

$$a_0 = 1$$

$$b_0 = 1$$

$$a_1 = 0$$

$$a_2 = 0.81$$

```
x = zeros(1,1000);
```

```
x(1)=1;
```

```
r = 0.9;
```

```
w = pi/2;
```

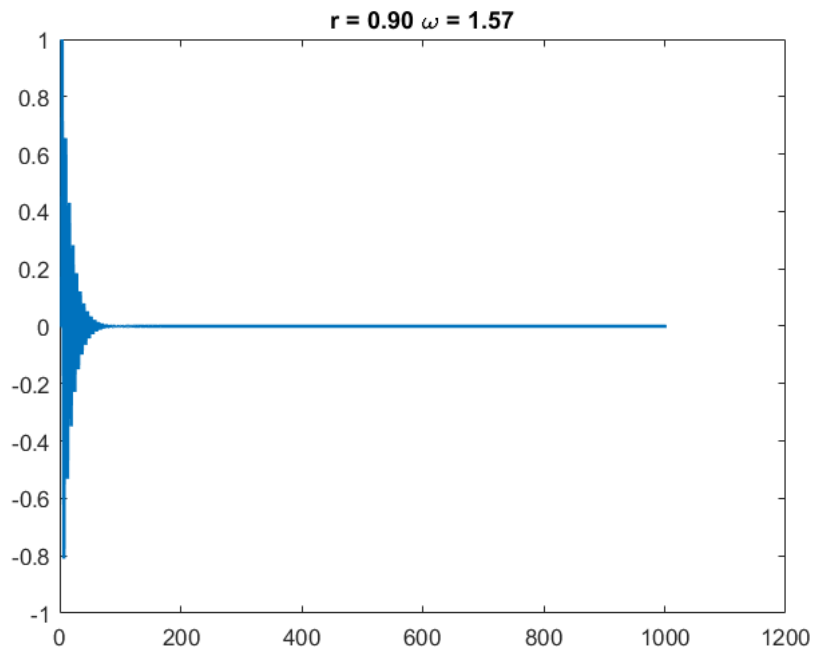
```

y = [0,0,0];

for i=1:1000
    new = x(i) + 2*r*cos(w)*y(end-1) - (r^2)*y(end-2);
    y = [y ,new];
end

figure()
plot(y,'LineWidth',1.5)
title_txt = sprintf('r = %.2f \omega = %.2f',round(r,2),round(w,2));
title(title_txt)

```



Effect of R

```

vec_r = 0:0.1:1;
w = pi/2;
for i= 1:length(vec_r)
    r = vec_r(i)
    display_grpah(i,r,w)
end

```

Effect of W

```
r = 0.5;
vec_w = -pi:pi/4:pi;
for j= 1:length(vec_w)
    w = vec_w(j);
    display_grpah(j,r,w)
end
```

```
function display_grpah(n,r, w)
    x = zeros(1,1000);
    x(1)=1;
    y = [0,0,0];

    for i=1:1000
        new = x(i) + 2*r*cos(w)*y(end-1) - (r^2)*y(end-2);
        y = [y ,new];
    end

    %cmap = hsv(12);
    figure()
    plot(y,'LineWidth',1.2,'Color','blue')
    title_txt = sprintf('%d th Plot of r = %.2f \omega = %.2f',n,round(r,2),round(w,2));
    title(title_txt)
    grid on
    xlabel('#sample')
    ylabel('Amplitude')
end
```