Ben Stear BMES 672 Homework #1

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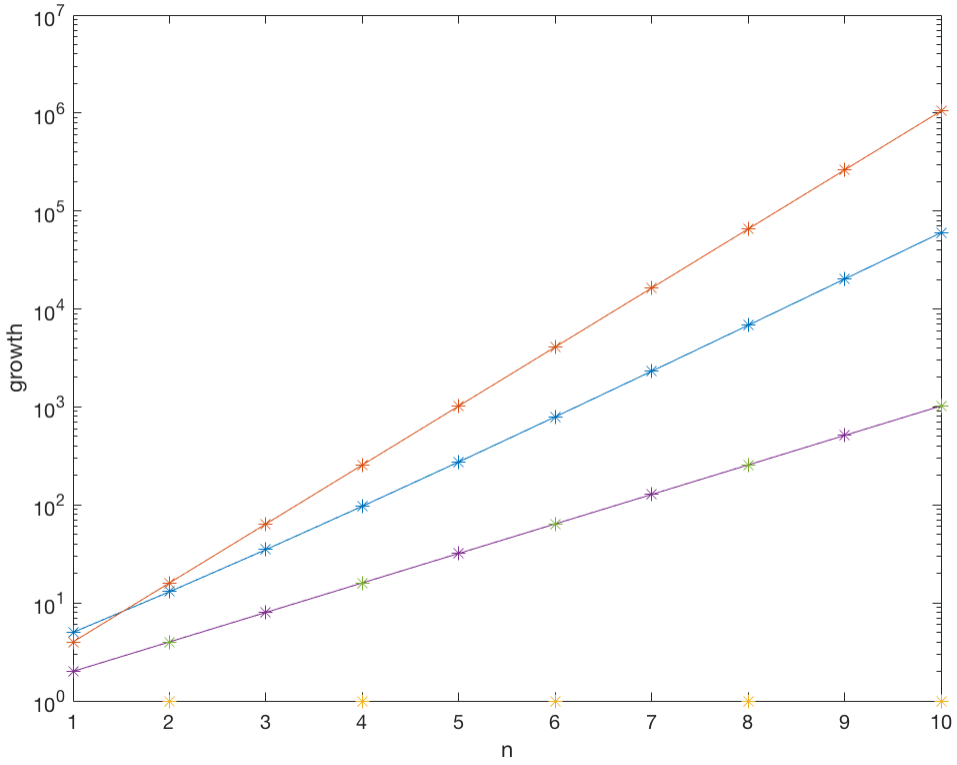
PART 1

1)

2)

```
n = 1:10;

% a)
x_2a = power(2,n)+power(3,n);
semilogy(n,x_2a,'*-');
hold on

% b)
x_2b = power(4,n);
semilogy(n,x_2b,'*-');

% c)
x_2c = power((-1),n);
semilogy(n,x_2c,'*-');

% d)
x_2d = power(2,n);
semilogy(n,x_2d,'*-');

% e)
x_2e = power(-2,n);
semilogy(n,x_2e,'*-');

% f)
xlabel('n')
ylabel('growth')

hold off;
```

```
Warning: Negative data ignored
```



7)

a)

```
A = [3 2;1 4];
[V,D]=eig(A)
```

```
V =

   -0.8944   -0.7071
    0.4472   -0.7071


D =

     2     0
     0     5
```

b)

```
A = [1/4 1;3/16 -1/4];
```

```
[V,D]=eig(A)


V =

    0.9701   -0.8000
    0.2425    0.6000


D =

    0.5000         0
         0   -0.5000
```

c) ?

d)

```
A = [1 1; 2 1];
[V,D]=eig(A)


V =

    0.5774   -0.5774
    0.8165    0.8165


D =

    2.4142         0
         0   -0.4142
```

e)

```
A = [-1 3; 0 1/3];
[V,D]=eig(A)


V =

    1.0000    0.9138
         0    0.4061


D =

   -1.0000         0
         0    0.3333
```

f)

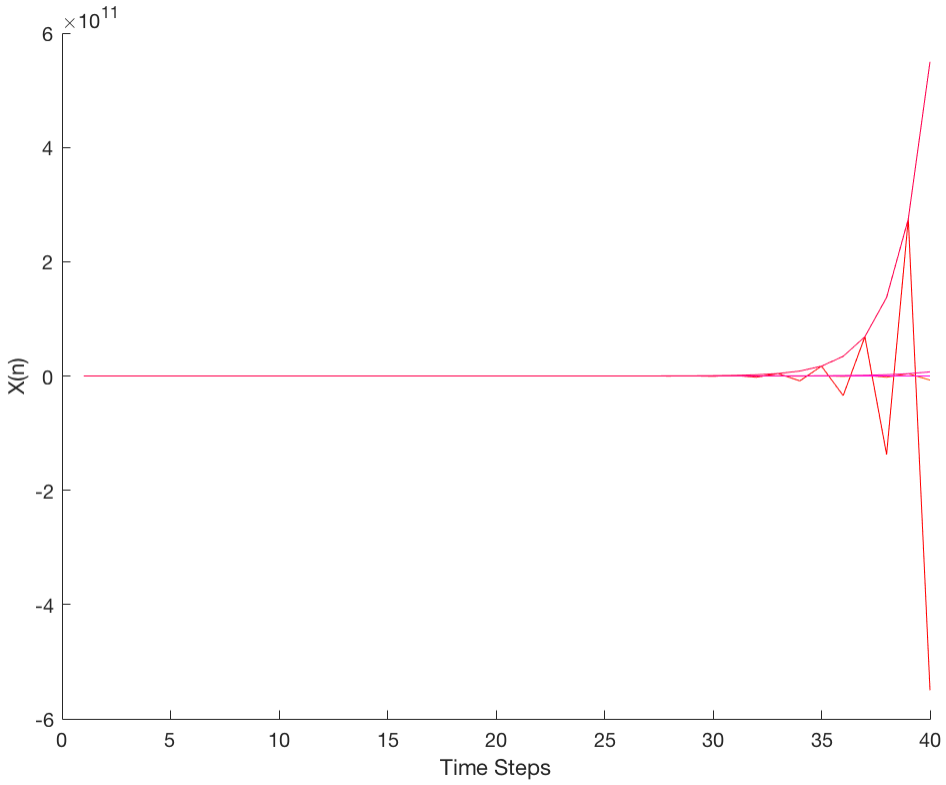
```
A = [1/4 3;-1/8 1];
[V,D]=eig(A)
```

```
V =

   0.9798 + 0.0000i   0.9798 + 0.0000i
   0.1225 + 0.1581i   0.1225 - 0.1581i


D =

   0.6250 + 0.4841i   0.0000 + 0.0000i
   0.0000 + 0.0000i   0.6250 - 0.4841i
```

PART 2 Discrete time model with one variable

Model the geometric equation x(n+1) = r * x(n)

```
time_steps = 40;
r_low = -2; r_high = 2; num_r_trials = 20;
r = linspace(r_low,r_high,num_r_trials);
x = zeros(1,time_steps);
x(1) = 1;

r_curves = zeros(num_r_trials,time_steps); % save values in here to
 plot later
r_curves(:,1) = 1; % set initial value for every 'r' trial

for i=1:length(r)
    for n = 2:time_steps
        r_curves(i,n) = r(i)*x(n-1);
        x(n)= r(i)*x(n-1);
    end
end

colorVec = hsv(num_r_trials);
figure
hold on

for j=1:length(r)
    plot(1:time_steps,r_curves(j,:),'Color',colorVec(j,:));
end

xlabel('Time Steps')
ylabel('X(n)')
```



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