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Question 1a

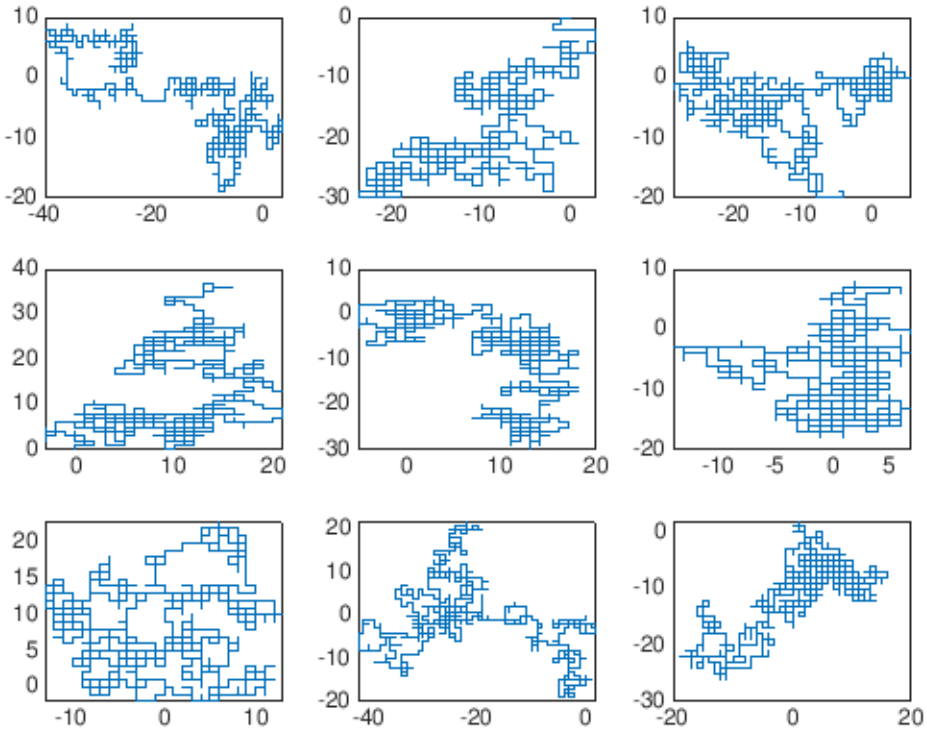
```
U=[0,1]; D=[0,-1]; %Up, down, left, right
L=[-1,0]; R=[1,0];

random_walk=[U;D;L;R];

for k=1:9
    s=[0,0];
    S=[0,0];
        for n=1:1000
            v=datasample(random_walk,1); %randomly choose 1 sample
 from matrix
            s=s+v;
            S=[S;s];
        end

subplot(3,3,k) ;plot(S(:,1),S(:,2))

 end
```



Question 1b

```
U=[0,1]; D=[0,-1];
L=[-1,0]; R=[1,0];

for k=1:9
    s=[0,0];
    S=[0,0];
    for n=1:1000
        r(n)=rand;
        if r(n)>0 & r(n)<=1/3
            s=s+up;
        elseif r(n)>1/3&r(n)<=2/3
            s=s+right;
        elseif r(n)>2/3&r(n)<=1
            s=s+left;
        elseif r(n)==0
            s=s;
        end
        S=[S;s];
    end
    subplot(3,3,k) ; plot(S(:,1),S(:,2))
end
```

Undefined function or variable 'left'.

```
Error in Michael_Bautista_HW5 (line 37)
            s=s+left;
```

Question 1c

```
U=[0,1]; D=[0,-1];
L=[-1,0]; R=[1,0];

for k=1:9
    s=[0,0];
    S=[0,0];
        for n=1:1000
            r(n)=rand;
            if r(n)<=26/100
                s=s+U;
            elseif r(n)>26/100&r(n)<=44/100
                s=s+R;
            elseif r(n)>44/100&r(n)<=66/100
                s=s+L;
            elseif r(n)>66/100&r(n)<=1
                s=s+D;
            end
            S=[S;s];
        end
subplot(3,3,k)
plot(S(:,1),S(:,2))
end

% The expected value is (-0.04, -0.08). Based on the graphs, it is
 seen
% that the random walk is concentrated more at the bottom since it has
%the biggest probability
```

Question 2a

```
p=3/4; %P(Xk = 1) = 3/4, P(Xk = -1) = 1/4

for m=1:100
    R(m)=nchoosek(2.*m,m).*p.^(m).*(1-p).^m; % R value produced
 through n steps
end

plot(R) ; title('R vs N')
```

Question 2b

```
R = [1]; L = [-1]; %Right and left
count=0; m=[];
for k=1:100
    s=[0];
    S=[0];
```

```
    for n=1:100
        r(n)=rand;
        if r(n)<=25/100
            s=s+L;
        elseif r(n)>25/100&r(n)<=1
            s=s+R;

        end
        S=[S;s];
    end
    m=[m,S];
    for v=2:100
        if S(v,1)==0
            count=count+1
            break
        end
    end


end
```

Question 3a

use 1/n.^(d/2) to approximate R where d=# of dimensions

```
for x=1:100
    R(x)=1/x.^(3/2); % P of returning to origin
end
plot(R)
title('R vs N')
```

Question 3b

```
U=[0,1,0]; D=[0,-1,0]; R=[1,0,0]; L=[-1,0,0];
fwd=[0,0,1]; back=[0,0,-1];
rand_walk=[U;D;L;R;fwd;back];
count=0;
m=[];
for k=1:100
    s=[0,0,0];
    S=[0,0,0];

    for n=1:100
        v=datasample(rand_walk,1); %randomly choose 1 sample from
 matrix
        s=s+v;
        S=[S;s];
    end
    m=[m,S];
    for v=2:100
        if S(v,:)==0
            count=count+1;
            break
```

```
        end
    end
end
```

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