M19_10_13_RandomWalkErica.m

```
b=1;                            %Sets fraction of random number
t(1)=0;                         %Initial time
potential(1)=rand;              %Initial random potential

for a=0:0.1:1                  %Fraction of previous potential
    for k=1:1:50
        potential(k+1)=(1-a)*potential(k)+b*(rand-0.5);   %Calculates potential
        t(k+1)=t(k)+pi/50;                                %Time increment
    end

 plot(t,potential, '-r', 'Color', rand(1,3))      %Plots time against potential
 xlabel('Time','FontSize', 10)
 ylabel('Potential','FontSize',10)
 grid on
 figure

end


```

M19_10_13_RandomWalkErica.m | M17_10_13_Plotting_potential_surface_many_points_corrected3.m

```

for a=1:1:5

      for b=1:1:5
          l=l+1;
          A(a,b)=rand;                                          %potential seed function
          position(l,1)=a;
          position(l,2)=b;
      end
end


for t=0:pi/4:2*pi
    l=0
   for j=1:1:5
      for k=1:1:5
        l=l+1;
        particlex=sin(t)+2;                                     %particle motion in x-direction
        particley=cos(t)+2;                                     %particle motion in y-direction
        fprintf('%f',t);
        potentialt=(0.9)*A(j,k)+0.0001*(rand-0.5);
        A(j,k)=potentialt;                                      %potential at each grid point
        position(l,3)=potentialt;
      end
   end
       scatter3(position(:,1),position(:,2),position(:,3));
       sf=fit([position(:,1), position(:,2)], position(:,3), 'poly44');    %fits surface to potential
       plot(sf,[position(:,1), position(:,2)], position(:,3))
       figure
       [fj, fk] = differentiate(sf, [j, k])                    %Electric field calculated as derivative of potential
end

```