Math 222 Exam 3 topics

1. Interpolation, least squares approximation, including parametric curve data. Plot data and error.
2. Pseudocolor plots, surface plots, curves in three dimensions
   pcolor(X,Y,Z), surf(X,Y,Z,C), plot3(x,y,z)
   Setting up the domain as rectangular grids
   Transforming from rectangular grids for parameter domains
      polar coordinate specification of domain
      cylindrical coordinates (cone $z = r$, ramp $z = \theta$, $0 \leq r \leq 1$, $0 \leq \theta \leq 10$, etc)
      other parametric surfaces
   Plotting curves on surfaces
   Function contours (level curves) for two-dimensional data $f(x,y)$

3. Simulation:
   Simulate a discrete probability distribution, or, more generally a random experiment
   Discrete distribution, e.g. $p = [0.2, 0.3, 0.5]$. Simulate 1000 trials of this distribution plot
   results in a bar graph, compare with expected values. Here is a semi-efficient approach
   P=[0 .2 .3 .5 1]; %cumulative distribution
   N=zeros(1,3); %to contain outcome counts
   for i=1:1000
     x=rand;
     for j=1:3
       if x>P(j) & x<P(j+1)
         N(j)=N(j)+1;
       end
     end
   end
   bar(1:3,N)
   Random walks of +/-1 or a random number e.g. dy=2*rand-1, collect data as directed
   (e.g. max value, ending value, number of zero crossings, time of last zero, etc)
   plotting the outcome of a random walk
   Ex:
   Random walk of length 100
   100000 trials. Where do you end up if you never return to zero?
   N=zeros(1,101); %hopefully that’s enough
   for n=1:100000
     y=0;
     for k=1:100
       if rand>.5, dy=1;, else dy=-1;end
       y=y+dy;
       if y==0, break;end
     end
     if y==0, N(y+51)=N(y+51)+1;end
   end
   bar(-50:50,N)