Math 151, Spring 2011
Jo Hardin
HW #3

Homework due on THURSDAY, FEBRUARY, 3RD, START OF CLASS.

1. DeGroot (3^{rd} or 4^{th} ed.), section 1.9: # 1, 4, 6, 7, 9

2. DeGroot (3^{rd} or 4^{th} ed.), section 1.10: # 4, 5, 7, 9(explain)

3. Additional problem in R: Consider the matching problem discussed in class (also in section 1.10 of your book). We'd like to see how quickly the probability of at least one match converges to the approximate probability: $(1 - 1/e)$.

```
myfun = function(x){
  prob=c()
  for (i in 1:length(x))
      {
      prob[i]=sum(exp(-lfactorial(1:x[i]))*(-1)^((1:x[i])+1))
      }
  return(prob)
  }
curve(myfun, 1, 10)
approxprob = 1 - 1/exp(1)
approxprob
```

   (a) Plot the probability of at least one match for $n = 1$ to 100. Comment on your plot and the convergence.

   (b) Explain why I say *approximate* to describe the quantity $(1-1/e)$ and why the plot you've created is *exact* for each value of n. That is, explain what is approximating what.

   (c) Investigate the behavior of the function by zooming in on the plot. Try different values over which to plot the function (`curve(myfunc,a,b)` for different `a` and `b`). Do you notice anything interesting? Explain.