Physics 213 **Problem 5** **Week 1**

Probability with Coins

(Math background that we think most, but not all of you, have.)

a) What is the probability that you get a head (H) on a toss of a fair coin?

b) What is the average number of heads that would be expected on ten tosses of a fair coin?

c) What is the probability that on those ten tosses you get HHHHHHHHHH?

d) What is the probability that on those ten tosses you get HTTHTHHTTH?

For the next two questions we no longer care what sequence we have, as long as the total number of heads is specified. This is described by the binomial distribution. The number of ways to have N_H heads in N tosses is:

$$C(N,N_H) = \frac{N!}{N_H!N_T!} = \frac{N!}{N_H!(N-N_H)!}$$

e) What is the probability that you will get exactly 5 heads with 10 tosses?

f) What is the probability that you will get exactly 3 heads with 10 tosses?