MATH 110 – QUIZ 7 – 16 OCTOBER 2009

Answer all of the following questions in the space provided.

1. (2 pts. each) Consider the experiment of tossing a coin three times and recording the result.

(a) Write down the sample space for this experiment. (Hint: There should be 8 outcomes in this sample space.)

$S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$

(b) Assuming that each outcome is equally likely, what is the probability of the event E = "exactly two heads are observed."

Since $E = \{HHT, HTH, THH\}$,

$$Pr(E) = \frac{n(E)}{n(S)} = \frac{3}{8}$$

2. (3 pts. each) Two balls are to be chosen at random from an urn that contains 12 red balls and 10 white balls.

(a) What is the probability that both balls are white?

$$\frac{\#\text{choices of 2 white balls from 10}}{\#\text{choices of 2 balls from 22}} \rightarrow \frac{\binom{10}{2}}{\binom{22}{2}} = \frac{\frac{10 \cdot 9}{2}}{\frac{22 \cdot 21}{2}} = \frac{10 \cdot 9}{22 \cdot 21} = \frac{5}{11} = \frac{15}{77} \approx .195$$

(b) What is the probability that at least one red ball is chosen?

If E = "both balls are white" then E' = "at least one ball is red" so

$$Pr(E') = 1 - Pr(E) = 1 - \frac{15}{77} = \frac{62}{77} \approx .805$$

or $\binom{12}{1}\binom{10}{1} + \binom{12}{2}$ = #choices of 1 red and 1 white ball + #choices of 2 red balls

= # choices containing at least 1 red ball $= 120 + 66 = 186$ $\therefore Pr(E') = \frac{186}{231} = \frac{62}{77}$