

**Worksheet #15; date: 10/17/2018**  
**MATH 55 Discrete Mathematics**

1. A coin is flipped 10 times where each flip comes up either heads or tails. How many possible outcomes contains more heads than tails?
2. How many ways are there to seat 12 people around a circular table? What if they are 3 couples who all want to sit next to their spouses?
3. (*Rosen 6.4.9*) What is the coefficient of  $x^{101}y^{99}$  in the expansion of  $(2x - 3y)^{200}$ ?
4. (*Rosen 6.4.25; modified*) Let  $n$  be a positive integer. Show that

$$2\binom{2n}{n+1} + 2\binom{2n}{n} = \binom{2n+2}{n+1}.$$

5. Show the identity above with a combinatorial argument.