CSE 103

Solution for Homework #1
Fall 2019

1. Find the number of different ways of arranging two `R` and three `G`'s in a row. Write out all the patterns.
   Patterns: GGGRR, GGRGR, GRGGR, RGGGR, GGRRG, GRGRG, RGGRG, GRRGG, RGRGG, RRGGG.
   Answer:
   $$\binom{3+2}{2} = \frac{5!}{2!3!} = \frac{120}{12} = 10$$

2. Find the number of different ways of arranging two `R`'s and one `G`'s in a row. Write out all the patterns.
   Patterns: GRR,RGR,RRG
   Answer:
   $$\binom{2+1}{1} = \frac{3!}{1!2!} = \frac{6}{2} = 3$$

3. A box contains two red balls and three green ones. Four draws are made at random with replacement from the box. Find the chance that (write the exact expression and the computed probability as integer percetages)

   (a) a red ball is never drawn
   $$(3/5)^4 \approx 13\%$$

   (b) a red ball appears exactly once
   $$\binom{4}{1}(3/5)^3(2/5)^1 \approx 35\%$$

   (c) a red ball appears exactly twice
   $$\binom{4}{2}(3/5)^2 * (2/5)^2 \approx 35\%$$

   (d) a red ball appears exactly three times
   $$\binom{4}{3}(3/5)^1 * (2/5)^3 \approx 15\%$$

(e) a red ball appears on all the draws

$$(2/5)^4 \approx 3\%$$

(f) a red ball appears at least twice

$$\approx 35\% + 15\% + 3\% \approx 53\%$$

4. A die is rolled five times. Find the chance that:

(a) an ace (one dot) never appears.

$$(5/6)^5 \approx 40\%$$

(b) an ace appears exactly twice.

$$\binom{5}{2}(5/6)^3(1/6)^2 \approx 10 \times 0.016 \approx 16\%$$

(c) an ace appears exactly five times.

$$(1/6)^5 \approx 0.012\%$$