

### 1. Tips for Binomial Random Variables (Section 5.2)

In BioStats 3510 we often make hand calculations, which, in addition to providing *quick* answers, also build *intuition* for software output.

- For the Binomial Distribution, we make hand calculations for exact numbers of successes  $x$  with the formula

$$P(x) = {}_n C_x \cdot p^x \cdot q^{n-x} = \frac{n!}{x!(n-x)!} \cdot p^x \cdot q^{n-x}$$

where

$${}_n C_x = \frac{n!}{x!(n-x)!}$$

calculates **the number of combinations of  $x$  items chosen from  $n$  items.**

**Example:** The probability of 4 successes in 22 trials is

$$P(x=4) = {}_{22}C_4 \cdot p^4 \cdot q^{18}$$

$$\begin{aligned} \text{where } p &= P(\text{Success}) \\ q &= P(\text{Failure}) = 1 - p \end{aligned}$$

- We can also hand calculate for several values for  $x$ , e.g.,

$$P(x \leq 2) = P(x=0) + P(x=1) + P(x=2)$$

- But when a large number of hand calculations becomes impractical — e.g.

$$P(x \leq 10) = P(x=0) + P(x=1) + P(x=2) + \cdots + P(x=10)$$

then a software option such as StatCrunch becomes really useful!

- In **MyLab Homework 5** and **Chapter 5 HW Quiz**, **StatCrunch** is accessible!

Use these steps:

(Open StatCrunch) > Stat > Calculators > Binomial

### 2. Tips for Combinations Formula by calculator - Be ready to calculate combinations in Friday's (10/8) Chapter 5 worksheet!

**Before Friday's class: Google your calculator's combinations calculation.**

**Check the answer below to confirm your correct combinations calculations:**


$${}_{10}C_6 = 210 \quad (\text{There are 210 possible combinations of 6 items chosen from 10 items})$$