

# BINOMIAL DISTRIBUTION

A FIXED NUMBER OF SUCCESSSES IN  $n$  TRIALS

$$P(X \text{ SUCCESSSES IN } n \text{ TRIALS}) = \binom{n}{x} (p)^x (1-p)^{n-x}$$

Annotations:  
-  $\binom{n}{x}$ : # OF WAYS SUCCESSSES CAN BE REARRANGED  
-  $(p)^x$ :  $p$  (SUCCESS)  
-  $(1-p)^{n-x}$ :  $P$  (FAILURE)  
-  $n$ : # OF TRIALS  
-  $x$ : # OF SUCCESSSES  
-  $n-x$ : # OF FAILURES

\* ON FORMULA SHEET

FOR FREE RESPONSE YOU MUST SPECIFY THE DISTRIBUTION BY STATING THE PARAMETERS  $n$  AND  $p$ .

(ex)  $X \sim \text{BINOM}(15, .3)$

MEAN:  $\mu_x = np$   
SD:  $\sigma_x = \sqrt{np(1-p)}$   
(FORMULA SHEET)

NOTE: GIVING CALC. COMMAND  $\text{BINOMPDF}(7, .2, 3)$  WILL NOT COUNT!!!

WRITE OUT FORMULA THEN USE CALC:

(ex)  $\binom{5}{3} (.2)^3 (.8)^2$  OR  $\binom{5}{0} (.2)^0 (.8)^5 + \dots + \binom{5}{3} (.2)^3 (.8)^2$

## CALCULATOR:


\*  $\text{BINOMPDF}(n, p, r)$   
FINDS PROB OF EXACTLY  $r$  SUCCESSSES IN  $n$  TRIALS

\*  $\text{BINOMCDF}(n, p, r)$   
FINDS PROB OF  $r$  OR FEWER SUCCESSSES IN  $n$  TRIALS


\*  $1 - \text{BINOMCDF}(n, p, r)$   
FINDS PROB OF MORE THAN  $r$  SUCCESSSES IN  $n$  TRIALS

## SHAPES OF BINOM. DIST'S


(A)  $p = 0.5 \Rightarrow$  SYMMETRIC  
(SAME AM'T OF SUCCESSSES + FAILURES)



(B)  $p < 0.5 \Rightarrow$  SKEWED RIGHT  
(MORE FAILURES THAN SUCCESSSES)



(C)  $p > 0.5 \Rightarrow$  SKEWED LEFT  
(MORE SUCCESSSES THAN FAILURES)



THE BINOMIAL DIST. IS A DISCRETE DIST.

\* DO NOT ROUND  $\mu_x$  TO WHOLE #!