

want: probability that a female with 5 offspring will have less than or equal to one offspring whose father is the female's mate.

we know: prob. that father is female's mate is 0.8 for each offspring

1. Define r.v.'s: Let $X = \#$ of offspring whose father is the female's mate

want: $\Pr(X \leq 1)$.

2. Identify distribution + parameter(s):

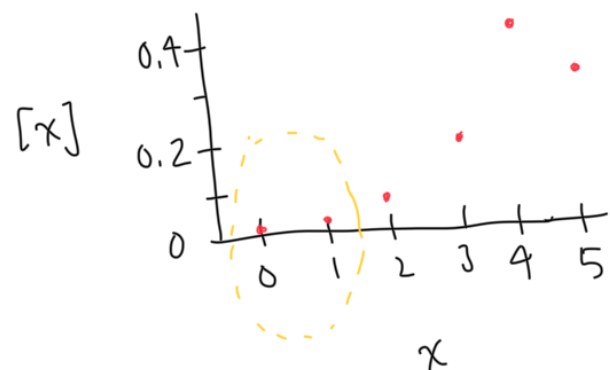
- Note: $S_X = \{0, 1, \dots, 5\}$

Each offspring's father is like a success/failure, where "success" $\equiv$ father is the female's mate

$\Rightarrow$ X can be viewed as # of successes in 5 trials, where each trial has 0.8 prob. of success!

$\Rightarrow X \sim \text{BINOMIAL}(n=5, p=0.8)$

3. Draw a picture (optional)



4. Calculate desired quantity: $\Pr(X \leq 1) = \Pr(X=0) + \Pr(X=1) \cdot [0] + [1]$

option 1:

	By Hand	Using R	Prob.
[0]	$\binom{5}{0} (0.8)^0 (1-0.8)^{5-0}$	<code>dbinom(0, 5, 0.8)</code>	0.00032
[1]	$\binom{5}{1} (0.8)^1 (1-0.8)^{5-1}$	<code>dbinom(1, 5, 0.8)</code>	0.00640

$$\text{so, } \Pr(X \leq 1) = 0.00032 + 0.00640 = \boxed{0.00672}$$

option 2: $\Pr(X \leq 1) = F_X(1) = \text{pbinom}(1, 5, 0.8) = \boxed{0.00672}$