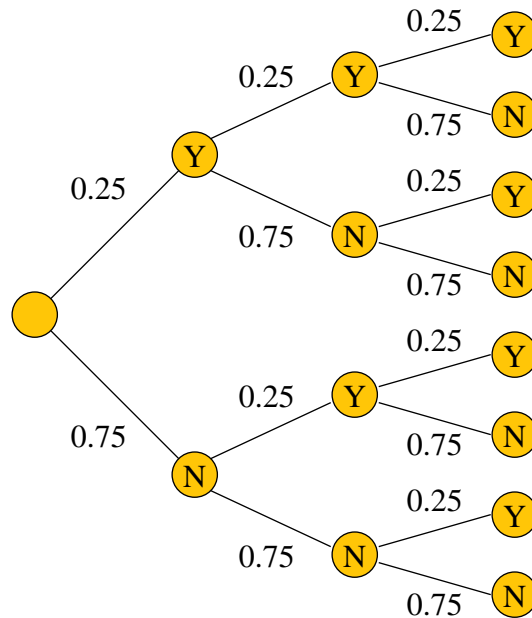


## Homework Solutions

### Chapter 8

### Central Limit Theorem

- (a) Draw a tree diagram three levels deep. Label each “yes” with 0.25 and each “no” with 0.75. Then compute the sampling distribution of  $\hat{p}$ .



From the diagram, we can calculate the probabilities of the possible values of  $\hat{p}$ .

Responses	No. of Yes's	$\hat{p}$	Probability
YYY	3	1	$(0.25)^3 = 0.0156$
YYN	2	$2/3$	$(0.25)^2(0.75) = 0.0469$
YNY	2	$2/3$	$(0.25)^2(0.75) = 0.0469$
YNN	1	$1/3$	$(0.25)(0.75)^2 = 0.1406$
NYY	2	$2/3$	$(0.25)^2(0.75) = 0.0469$
NYN	1	$1/3$	$(0.25)(0.75)^2 = 0.1406$
NNY	1	$1/3$	$(0.25)(0.75)^2 = 0.1406$
NNN	0	0	$(0.75)^3 = 0.4219$

Finally, summarize this in a table.

$\hat{p}$	Probability
0	0.4219
$1/3$	0.4219
$2/3$	0.1406
1	0.0156

(b) According to the Central Limit Theorem,  $\mu_{\hat{p}} = p = 0.25$  and

$$\begin{aligned}\sigma_{\hat{p}} &= \sqrt{\frac{p(1-p)}{n}} \\ &= \sqrt{\frac{(0.25)(0.75)}{3}} \\ &= 0.25.\end{aligned}$$