p.98 243

① 10-17

53. $9! = 362{,}880$

55. $_6P_3 = \dfrac{6!}{(6-3)!} = \dfrac{6!}{3!}$

$= 120$

57. Experiment: Select 3 of the 14 parts.

$n(S) = {}_{14}C_3 = \dfrac{14!}{3!\,11!} = 364$

Event A: we choose 3 faulty parts

$n(A) = 1 \qquad P(A) = \dfrac{n(A)}{n(S)} = \dfrac{1}{364} = .00275$

②

58. Experiment: Select 6 numbers from 36.

$n(S) = {}_{36}C_6 = \dfrac{36!}{6!\,30!} = 1{,}947{,}792$

Event A: we select all 6 of the winning numbers.

$n(A) = 1$

$P(A) = \dfrac{1}{1{,}947{,}792} = .000000513$

59. Same experiment.

Event B: We select 5 of the 6 winning numbers.

③

$$n(B) = {}_6C_5 \times 30$$
$$= 6 \times 30 = 180$$

$$P(B) = \frac{180}{1{,}947{,}792} = .0000924$$

Sec 2.7 Bayes' Rule

<u>Example</u>: Your train takes you either to Seattle or San Francisco. There is a 30% chance of going to Seattle.

④

If you arrive in Seattle, there is an 80% chance that the first street corner will have a Starbucks. If you arrive in S.F., there's only a 10% chance.

Given that you see a Starbucks on the 1st street corner, what is the probability that you are in Seattle?

A: Seattle　　　B: Starbucks

$\bar{A}$: S.F.　　　$\bar{B}$: no Starbucks

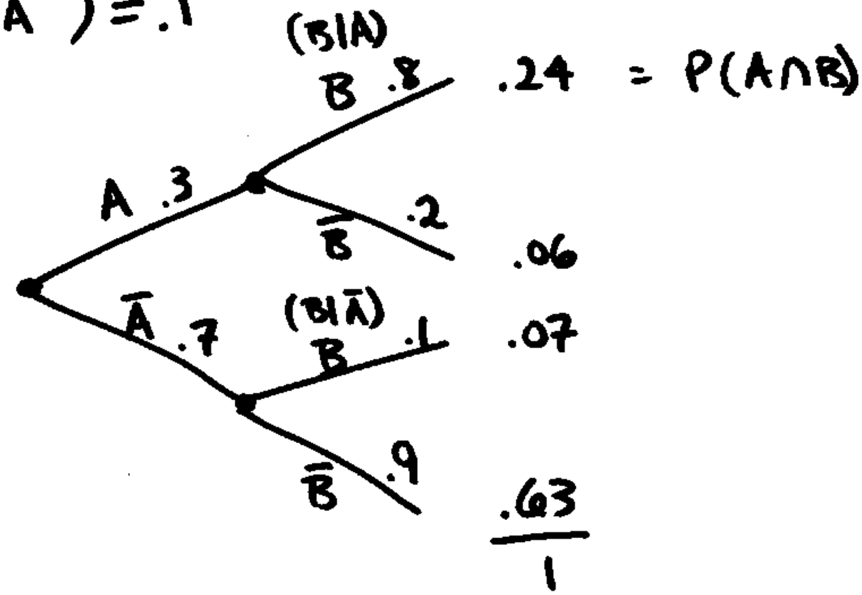
⑤

$P(A) = .3$

$P(B \mid A) = .8$

$P(B \mid \bar{A}) = .1$

Find $P(A \mid B)$



⑥

	B	$\bar{B}$	
A	.24	.06	.3
$\bar{A}$	.07	.63	.7
	.31	.69	1

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)} = \frac{.24}{.31} = .77$$

Example: A certain disease affects 1% of the population.
The test for the disease has a false positive rate of 2%.
Also, it has a false negative rate of 4%.

Given that you have tested positive, what is the probability that you actually have the disease?

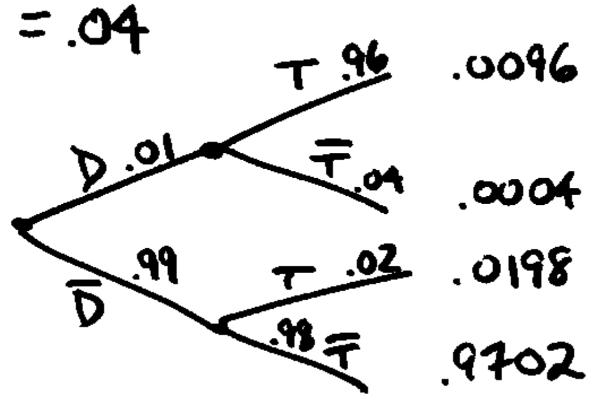
D: disease T: test positive

$\bar{D}$: no disease $\bar{T}$: test negative

$P(D) = .01$

$P(T \mid \bar{D}) = .02$ Find $P(D \mid T)$

$P(\bar{T} \mid D) = .04$



9

	T	$\bar{T}$	
D	.0096	.0004	.01
$\bar{D}$	.0198	.9702	.99
	.0294	.9706	1

$$P(D|T) = \frac{P(D \cap T)}{P(T)} = \frac{.0096}{.0294} = .33$$

10

Quiz 2 Thursday 10/19

Box plots

Probability & Counting Rules

(No Bayes')