

P89

①

324 10 CDs

451

5 jazz

1-28

Select 4 out of the 10. $n(5) = \binom{10}{4}$

let $X = \# \text{ jazz CDs selected}$

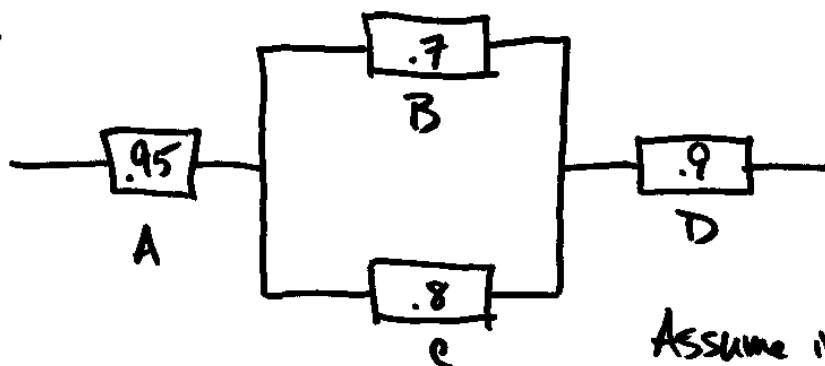
x	$p(x)$
0	$\binom{5}{0} / \binom{10}{4}$
1	$\binom{5}{1} \binom{5}{3} / \binom{10}{4}$
2	$\binom{5}{2} \binom{5}{2} / \binom{10}{4}$
3	$\binom{5}{3} \binom{5}{1} / \binom{10}{4}$
4	$\binom{5}{4} / \binom{10}{4}$

$$p(x) = \frac{\binom{5}{x} \binom{5}{4-x}}{\binom{10}{4}}$$

$$x = 0, 1, 2, 3, 4$$

P67
98

②



Assume independence

$$P[A \cap (B \cup C) \cap D]$$

$$= P(A) P(B \cup C) P(D)$$

$$= .95 (.94) (.9)$$

$$= .8037$$

$$P(B \cup C) =$$

$$P(B) + P(C) - P(B \cap C)$$

$$= .7 + .8 - (.7 \times .8)$$

$$= .94$$

(3)

p.66

$$86. P(H) = .21$$

$$P(W) = .28$$

$$P(H \cap W) = .15$$

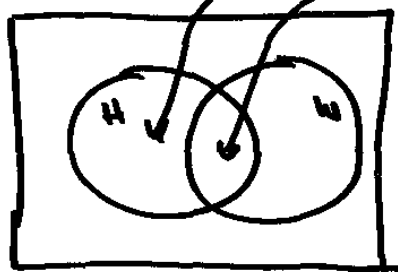
$$\begin{aligned} a) P(H \cup W) &= P(H) + P(W) - P(H \cap W) \\ &= .21 + .28 - .15 = .34 \end{aligned}$$

$$b) P(W|H) = \frac{P(W \cap H)}{P(H)} = \frac{.15}{.21} = .71$$

$$c) P(H|W') = \frac{P(H \cap W')}{P(W')} = \frac{.06}{.72} = .08$$

(4)

$$H = (H \cap W') \cup (H \cap W)$$



$$P(H) = P(H \cap W') + P(H \cap W)$$

$$.21 = P(H \cap W') + .15$$

p.89

8. $W = \# \text{heads} - \# \text{tails in 3 tosses}$

$$P(\text{heads}) = 2/3$$

w	$p(w)$
-3	$(\frac{1}{3})^3$
-1	$3(\frac{2}{3})(\frac{1}{3})^2$
1	$3(\frac{1}{3})^2(\frac{2}{3})$
3	$(\frac{2}{3})^3$
	1

(5)

All 3 tails

1 head, 2 tails

2 heads, 1 tail

All 3 heads

From last class: We constructed a joint probability distribution $p(x, y)$

$$\sum_y p(x, y) = P(X=x) = f(x) \quad (\text{marginal})$$

$$\sum_x p(x, y) = P(Y=y) = g(y) \quad (\text{marginal}) \quad (6)$$

The conditional distribution of X , given y

$$h(x|y) = \frac{p(x, y)}{g(y)}$$

In the dice example,

$$\begin{aligned} h(2|3) &= \frac{p(2, 3)}{g(3)} = \frac{P(X=2 \cap Y=3)}{P(Y=3)} \\ &= \frac{2/36}{5/36} = 2/5 = .4 \end{aligned}$$

(7)

Example A team plays 3 games, with independent outcomes

They usually win 50%

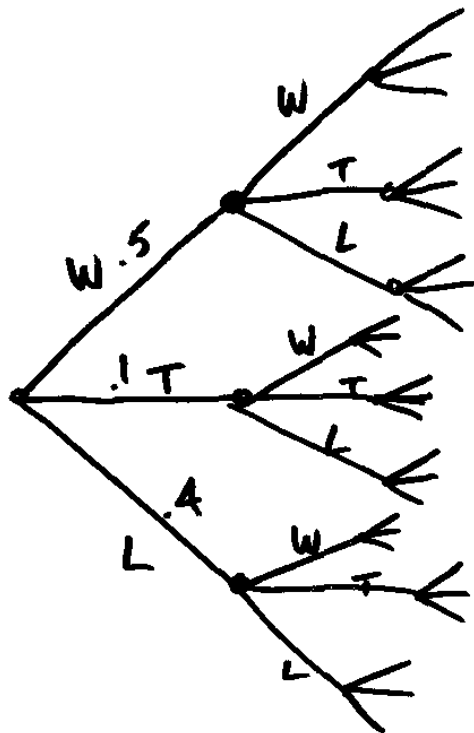
lose 40%

tie 10%

$X = \# \text{wins}$ $Y = \# \text{losses}$

Construct the joint and marginal distributions

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(9)

		Y				
		0	1	2	3	
X	0	$(.1)^3$	$3(.4)(.1)^2$	$3(.4)^2(.1)$	$(.4)^3$	.125
	1	$3(.5)(.1)^2$	$6(.5)(.4)(.1)$	$3(.5)(.4)^2$	0	.375
	2	$3(.5)^2(.1)$	$3(.5)^2(.4)$	0	0	.375
	3	$(.5)^3$	0	0	0	.125
		.216	.432	.288	.064	1

(10)

Find the conditional probability of winning all 3, given that there are no losses.

$$h(3|0) = \frac{p(3,0)}{q(0)} = \frac{(.5)^3}{.216}$$

"

$$P(X=3|Y=0) = .579$$

$$p(x,y) = \frac{3!}{x!y!(3-x-y)!} (.5)^x (.4)^y (.1)^{3-x-y}, \quad 0 \leq x+y \leq 3$$

HW #4 due 2/4

⑩

P.101 # 40, 44, 52

P.113 # 10, 12, 26

P.122 # 46, 50