

STT 200 11-9-09

Note Title

11/9/2009

- (1) THE GRADER PROGRAM (ON UNIVERSITY LABS ONLY)
- (2) GO INTO PROBABILITY AND ASSIGNMENT 11-10-09.

(1) TO START "GRADER" FROM A U. LAB COMPUTER
YOU USE INTERNET EXPLORER TO GET TO OUR WEBSITE
→ GRADER CLICK → LAUNCHES IN MATHMATICA

YOU'LL SEE A PANEL

DO YOU...
INITIALIZE ~
~ YES CLICK.

THEN YOU SEE



AS IN A PDF CALLED GRADER PREVIEW.

UP POPS GRADER READY TO GO!

(2) PROBABILITY

(a) NOTION OF INDEPENDENCE

(b) BAYES' METHOD

CLASSICAL (EQ PROBABILITY) MODEL
FOND OF EVERYTHING -

GENERAL RULES OF PROBABILITY.
FREES YOU UP -

EXAMPLES DRAWING COLORED BALLS.
TREE DIAGRAMS
TABLES.

BEGIN WITH QUESTION: Box $\{ \$1_a, \$1_b, \$5 \}$

JACK DRAWS A BILL WITH $\frac{1}{3}$ CHANCE EACH.

$$? P(\text{JACK } \$1) = \frac{\# \text{ CASES FAVORABLE}}{\# \text{ CASES TOTAL}}$$

NOW LET'S SUPPOSE JILL (DRAWS AFTER JACK)
WITH $\frac{1}{2}$ $\frac{1}{2}$ CHANCE ON THE TWO BILLS THEN REMAINING.

$$? P(\text{JILL GETS } \$5) \quad \text{ANS. } \frac{1}{2} \cdot \frac{1}{2}$$

GOLO STANDARD: ENUMERATE EQUALLY LIKELY OUTCOMES.

JACK	JILL	CASES WITH JILL \$
$\rightarrow 1_a$	1_b	
$\rightarrow 1_a$	5	*
$\rightarrow 1_b$	1_a	

SO CLASSICAL PROBABILITY GIVES

$$P(\text{JILL } \$5) = \frac{\# \text{ FAVORABLE}}{\# \text{ TOTAL}} = \frac{2}{6} = \frac{1}{3}$$

→ 1_b 5 *

→ 5 1_a

→ 5 1_b

CONFIRM THIS ANSWER?

$$P(\text{JILL } \$5 \mid \text{JACK } \$1) = \frac{1}{2} \quad \text{ALSO } P(\text{JILL } \$5 \mid \text{JACK } \$5) = 0$$

$$P(\text{JACK } \$1) = \frac{2}{3}$$

$$P(\text{JACK } \$5) = \frac{1}{3}$$

WE'LL SEE THAT BREAK

$$P(\text{JILL } \$5) = P(\text{JACK } \$1 \text{ and JILL } \$5) + P(\text{JACK } \$5 \text{ and JILL } \$5)$$

$$= P(\text{JACK } \$1) P(\text{JILL } \$5 \mid \text{JACK } \$1)$$

$$= \frac{1}{3} \cdot \frac{2}{3} \cdot \frac{1}{2} = \frac{1}{3} \text{ AS ABOVE}$$

RULES FREE US TO WORK WITH SOME PROBABILITIES
TO GET OTHERS.

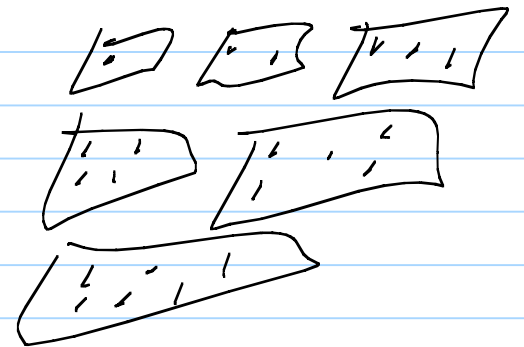
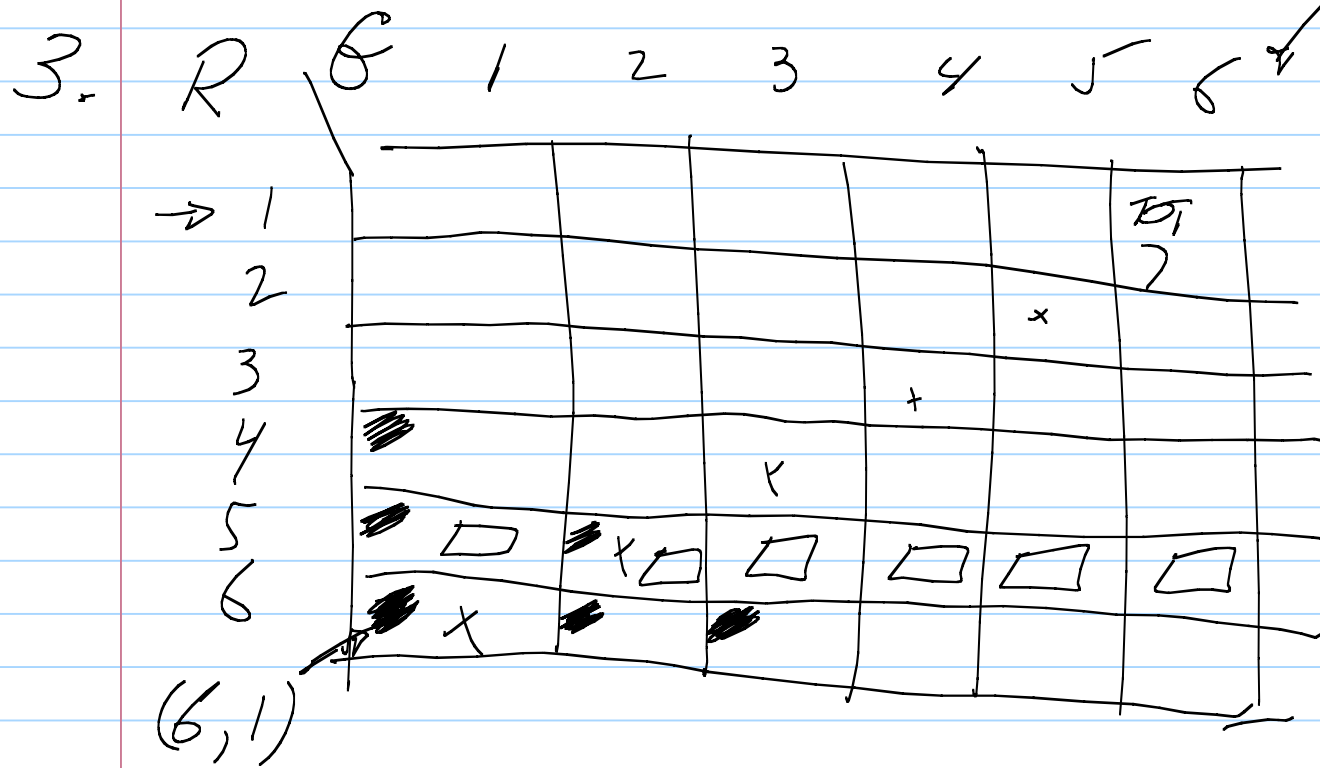
LOOK AT ASSIGNMENT 11-10-09.

$$1. \text{ EXPECT } \sim .49(10,000) = 4900$$

GOOD BUSINESS
BECAUSE IT
REALLY WORKS
WELL.

So too "ideally" it rains on $\approx 21\%$ of days with
 forecast "21% chance of rain." — not 50!

$PR = .60 \Rightarrow$ in 1000 days have rain $\approx .6(1000) = 600$



$$P(R+G=7) = \frac{6}{36} = \frac{1}{6}$$

$$(a) \underline{P(R > 8+2)} \text{ denote by } \equiv = \frac{6}{36} = \frac{1}{6} \text{ also}$$

$$(c) P(R^2 = 25) = P(R=5) = \frac{6}{36}$$

4. (a) \$1 \$1 \$1 \$5 JACK FIRST PR $\frac{1}{4}$ ea.

JILL PR $\frac{1}{3}$ ON THOSE REMAINING

CONFIRM $P(\text{JILL } \$5) = P(\text{JACK } \$5) = \frac{1}{4}$.

(b) IF JACK \$1 WANTS PR JILL (THEN) GETS \$5.

ANS. Box is now $[\$1 \$1 \$5]$ so JILL'S PR is now $\frac{1}{3}$.

WRITE THIS AS $P(\text{JILL } \$5 \parallel_{\text{IF}} \text{JACK } \$1) = \frac{1}{3}$

7. LIST ALL POSSIBLE [1a 1b 1c 5]

JACK	JILL
1a	1b
1a	1c
1a	1d
1a	5 ✓
1b	1a
"	1c
"	1d
"	5 ✓ etc.

JACK	JILL
1a	1a
"	1b
"	1d
"	5 ✓
5	1a
"	1b
"	1c
"	1d

4x3 = 12 POSSIBLE

$$P(\text{JILL } \$5) = \frac{3}{12} = \frac{1}{4}$$

SAME AS JACK

ORDER OF THE DEAL

DOES NOT MATTER.

7c. AMONG CASES W/ JACK \$1 WHAT FRACTION HAVE JILL \$5?

$$\begin{array}{c}
 \$1 \leftarrow \left[\begin{array}{c} \$1 \quad \$1 \quad \$5 \end{array} \right] \text{ so } P(\text{JILL } \$5 \mid \text{JACK } \$1) \\
 = \frac{1}{3}
 \end{array}$$

9. DRAWING COLORED BALLS.

$$\begin{array}{c}
 P(R1) \stackrel{\text{CLASSICAL}}{=} \frac{2}{6} = \frac{1}{3} \\
 \uparrow \\
 \text{FIRST DRAW} \\
 15 \text{ RED}
 \end{array}
 \quad
 \begin{array}{c}
 \left[\begin{array}{c} 2R \quad 3G \quad 1Y \end{array} \right] \left. \begin{array}{c} \text{TOTAL} \\ \text{OF } 6 \end{array} \right\} \\
 P(R1 \cup G1) = \frac{2+3}{6} = \frac{5}{6} \\
 \cup \text{ (UNION)}
 \end{array}$$

? $P(R2)$ SAME AS $P(R1) = \frac{1}{3}$ BY CLASSICAL CALCULATION

10. ENUMERATE!!
ALL POSSIBILITIES

$\{a_a a_a g_a g_b g_c y\}$

$6 \times 5 = 30$
TO ENUMERATE
≡

2. INSTEAD FIRST DRAW IS REPLACED PRIOR TO ^{SECOND} DRAW.

$\{2R 3G y\}$

$P(y2 |_{IF} y1) = \frac{1}{6}$ FACE SECOND DRAW FROM
 $P(R2 |_{IF} R1) = \frac{2}{6}$ $\{2R 3G y\}$

COMPARE ABOVE
WIT # →

IN FORMER CASE
WITHOUT REPLACEMENT

$$P(Y_2 | Y_1) = 0$$

FROM

[2R 3G]

$$P(R_2 | R_1) = 1/5$$

FROM

[R 3G 4]