Organized Counting

Sept 18/2018

There are various methods we use to organize and illustrate our information, particularly outcomes.

(1) Lists (or sets)
(2) Tree diagrams (outcomes or probabilities)
(3) Charts/tables
(4) Map pathways (new, useful?)

Sep 13-9:29 AM

Illustrating Outcomes - Set / List

Ex. Rolling two 6-sided dice

S = { (1,1), (1,2), (1,3), (1,4), (1,5), (1,6),
(2,1), (2,2), (2,3), (2,4), (2,5), (2,6),
(3,1), (3,2), (3,3), (3,4), (3,5), (3,6),
(4,1), (4,2), (4,3), (4,4), (4,5), (4,6),
(5,1), (5,2), (5,3), (5,4), (5,5), (5,6),
(6,1), (6,2), (6,3), (6,4), (6,5), (6,6) }

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Illustrating Outcomes - Set / List

Ex. Rolling two 6-sided dice

S = { 2, 3, 3, 4, 4, 4, 5, 5, 5, 5, 6, 6, 6, 6, 6,
7, 7, 7, 7, 7, 7, 8, 8, 8, 8, 8, 9, 9, 9, 9,
10, 10, 10, 11, 11, 12 }

Note: You generally want to track each individual outcome, even if they are the same.

A set of unique outcomes is shorter, but **cannot be used for probability calculations**.

S = { 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 }

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Illustrating Outcomes - Table / Matrix

Ex. Rolling two 6-sided dice

	Outcome	Die 1					
		⚀	⚁	⚂	⚃	⚄	⚅
Die 2	⚀	2	3	4	5	6	7
	⚁	3	4	5	6	7	8
	⚂	4	5	6	7	8	9
	⚃	5	6	7	8	9	10
	⚄	6	7	8	9	10	11
	⚅	7	8	9	10	11	12

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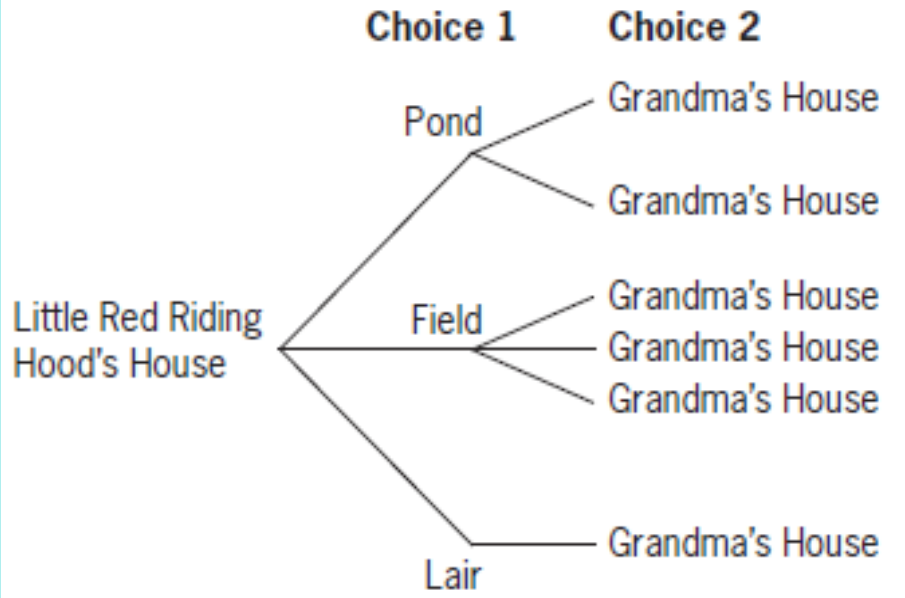
Illustrating Outcomes - Decision Tree

Ex. Little Red Riding Hood trying to get to Grandma's house.



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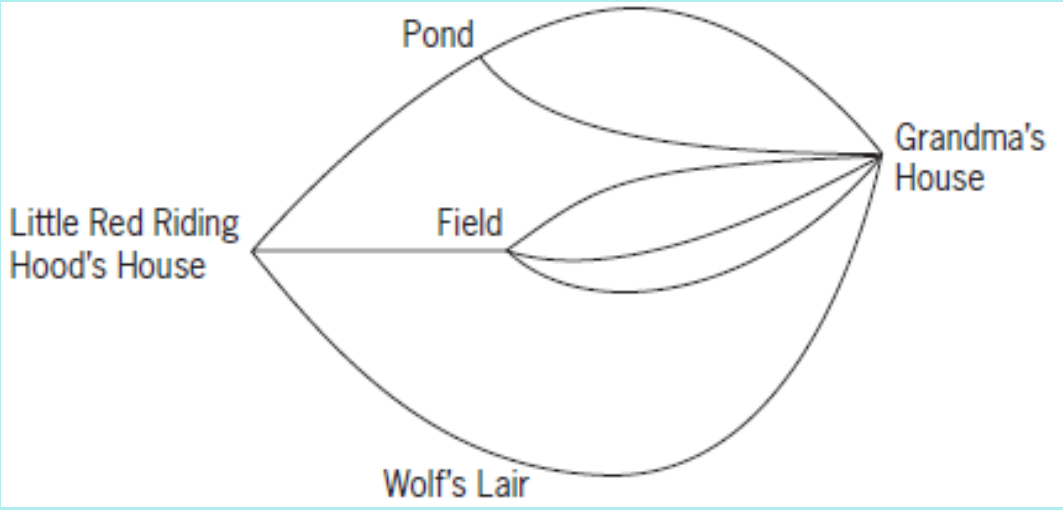
Illustrating Outcomes - Map

Ex. Little Red Riding Hood trying to get to Grandma's house.



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The Fundamental Counting Principle

If one event can occur in *m* ways and a second in *n* ways, then together the number of ways they can occur is:

$$m \times n$$

This can be extended to any number of independent events with distinct choices:

$$m \times n \times p \times \ldots$$

where m is the number of ways to count event 1,
n is the number of ways to count event 2, etc.

5 coin flips: $2 \times 2 \times 2 \times 2 \times 2 = 2^5$

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Ex. When buying a new phone, choices are:

- 2GB, 4GB, or 8GB of memory
- 64GB or 128GB of storage
- 10 colours

How many configurations are possible?

$(3)(2)(10) = 60$

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Assigned Work:

p.68 # 3 - 6, 8, 12, 14*

p.73 # 3, 5, 7, 13, 14, 22* (see 15a for help)

p.68 #14 aaa-lll-dddd 0-9

2 choices

519 - $\frac{lll}{80}$ - $\frac{dddd}{10^4 = 10\times10\times10\times10}$

226 - $\frac{lll}{39}$ - $\frac{dddd}{10^4}$

for 519 : 80×10^4

226 : 39×10^4

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p.73 #14

_ _ _ _ _ _ _ _

10 { 0 : 9

26 { a : z

26 { A : Z

62

$n(S) = n(all) = 62^8$

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A A A A 0 0 0

1: +1

1:+1x10

1:+1x100

B: +1x1000

B: +1x26x1000

B: +1x26x26x1000

B: +1x26x26x26x1000

A	C	M	A	2	1	3
D	M	E	L	4	2	9
3	10	18	11	2	1	6

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