

Lesson #10 week 5 (topics 6-7)

1) A certain disease has an incidence rate of 0.8%. If the false negative rate is 5% and the false positive rate is 4%, compute the probability that a person who tests positive actually has the disease.

$0.8\% \Rightarrow \frac{0.8}{100} = 0.008 \rightarrow \text{meanly Real life} = \frac{8}{1000}$

	False + 4%	False - 5%	Total
Disease	$8 - 6.4 = 1.6$	$0.05 \times 8 = 0.4$	8
No Disease	$992 \times 0.04 = 39.68$	$992 - 39.68 = 952.32$	992
Totals	41.28	952.72	1000

$4\% = 0.04$   
 $5\% = 0.05$

A: Disease     $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{1.6}{41.28}$   
B: tests positive

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2) A die is rolled twice. What's the probability of showing a 3 on the first roll and an even number on the second roll?

DIE = 6 FACES

1 Roll:  $\frac{1}{6}$  (for #3)

2 Roll:  $\frac{3}{6} = \frac{1}{2}$  (for even #)

$\frac{1}{6} \times \frac{3}{6} = \frac{3}{36} = \frac{1}{12}$

Outcomes: (3,2), (3,4), (3,6)

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DIE

1 Roll: 6, 1, 2, 3, 4, 5, 6

2 Roll: 6 = 36

Outcomes: (1,1), (2,1), (3,1), (4,1), (5,1), (6,1)  
(1,2), (2,2), (3,2)  
(1,3), (2,3), (3,3), (4,3), (6,3)  
(1,4), (2,4), (3,4)  
(1,5), (2,5), (3,5)  
(1,6), (2,6), (3,6)

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$\frac{1 \text{ Roll}}{\text{even \#}} \cdot \frac{2 \text{ Roll}}{3} = \frac{3}{36}$

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New Question

Omar buys a bag of cookies that has

- 5 chocolate chip cookies
- 6 peanut butter cookies
- 4 sugar cookies
- 7 oatmeal cookies

$\Sigma = 22$

$P(\text{oatmeal, sugar}) = \frac{7}{22} \cdot \frac{4}{21} = \frac{28}{462}$

note: eats the cookies

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Suppose that 33% of people own dogs. If you pick two people at random, what's the probability that they both own a dog?

$33\% = \frac{33}{100} = 0.33 \Rightarrow \frac{33}{100}$

1st person:  $\frac{33}{100}$   
2nd person:  $\frac{33}{100}$

$\frac{33}{100} \cdot \frac{33}{100} = \frac{1089}{10000}$

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