



**IIT Madras**  
ONLINE DEGREE

**Statistics for Data Science-1**  
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**Week 7 Tutorial 3**

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men voters voted in the last local election. If a registered voter from this community is randomly chosen, find the probability that this person is

i) A woman who voted in the last election

ii) A man who did not vote in the last election

iii) What is the conditional probability that this person is a man given that this person voted in the last election?

$\frac{0.3672N}{0.3672N + 0.2852N} = 0.3672$

$\frac{0.1748N}{0.1748N + 0.2852N} = 0.1748$

$\frac{0.4375}{0.3672 + 0.2852} \approx 0.4375$

	Voted	Not Voted
Women	$0.54N \times 0.68 = 0.3672N$	$0.54N \times 0.32 = 0.1728N$
Men	$0.46N \times 0.62 = 0.2852N$	$0.46N \times 0.38 = 0.1748N$

Of the registered voters in a certain community 54% are women and 46% are men. So, let us say there are  $N$  registered voters totally. So, 54% are women which means the women are  $0.54N$  and the remaining 46% are men. So, men are  $0.46N$  so these are the total number of women and men voters in this  $N$ . Now among them 68% of registered women voters, so of the 5.54 and 68% and 62 percent of the registered men voters which is 62% of the  $0.46N$ .

So, we have a situation like this let us draw a box so let this row be women and this row be men and what is the other criterion they voted in the last election, so the 68% of women and 62% of men voted in the election so this would be they voted and not voted. So, now we try to fill these boxes so of these  $0.54N$ , 68% voted which means this box would be  $0.54 \times 0.68$  and this is equal to  $0.3672N$ . So, this is a number of women who voted and of that  $0.54$  and the remaining 32 percent have not voted, so that would be  $0.54N \times 0.32$  which will give us  $0.1728N$ .

And for men also we have similar logic so of these  $0.46N$  62% that is  $0.62$  have voted so this will give us  $0.2852N$  and the remaining 38% would be  $0.46N \times 0.38$  which is equal to  $0.1748N$ . So, we now have the total number of people who voted and did not vote and also their gender wise split. So, now we can try to answer these questions a woman who voted in the last election so if a registered voter from this community is randomly chosen find the probability that this person is a woman who actually voted and for that the denominator is clearly the total number of registered voters which is  $N$  and the numerator would be the number of women who voted which is  $0.367N$ .

And these two cancel so the probability is  $0.3672$  and the probability that this person is a man who did not vote and for that we are looking at men who did not vote which is this value and thus this would be  $0.1748N/N$ ,  $N$  and  $N$  cancels so we have this probability  $0.1748$  and then lastly we are looking for the conditional probability this person is a man given that this person voted.

So for that we have to look for only the voted cases which would be this plus this this would be the sum of these two would make the denominator so we would have  $0.3672 + 0.2852$  in the denominator  $N$  and  $N$  and the numerator would be the number of such men which would be  $0.2852N$  this is coming out to be roughly  $0.43715$ , so this value is  $0.43715$  this is a conditional probability.