

# module1\_lecture3

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## SUMMARY KEYWORDS

inequality, survey, party, votes, values, right hand side, computed, greater, algebraic expression, fraction, question, exceed, deeper insight, win, succinctly, nba, compare, calculator, side, hope

## SPEAKERS

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So now that we have this right, a related, related question here is that when can party C hope to win based on the results of the survey? What, what result of the survey will make party C happy, right? So, so the question boils down to, will party C get more votes than party L? And how do we find that? So remember, we already computed the number of votes that party C can hope to get, which is  $880 + 1200X$ . We computed the number of votes that party L can hope to get, which is  $920 + 1200 \times (1 - X)$ . And the question is, is that does this exceed, exceed this, right? So the question boils down to is, does this expression here exceed the expression on the right hand side? And so for what values of  $X$  does the left hand side is, is greater than the right hand side, right? So this is an example of an inequality.

And what I'll show you is, is solving this inequality, and how that gives us a deeper insight into the problem that for what values of the survey will indicate that party C is more likely to win than party L. So what we need to do is compare the two sides of this inequality, right? So an inequality can be treated just like an equation, except that instead of the equation sign, it's an inequality sign. So what I'm going to do is I'm going to expand the right hand side, because there's a bracket here. So let me open up the bracket by expanding it.

And then, what I'm going to try and do is collect all the  $X$  terms to one side. So I'm going to take this to this side, and I'm going to take this to the other side. So if, if I do that, then this becomes  $1200X + 1200X$ . This should be greater than  $920 + 1200 - 880$ . So if you look at the left hand side, add up the two  $1200X$ 's, that becomes  $2400X$ . And we want this to be greater than, so let's add these two up, right. So that's  $2120 - 880$ , right? So that's  $1240$ . So we need this  $2400X$  to be greater than  $1240$ . So  $X$  should be greater than  $1240$  divided by  $2400$ . And you can use a calculator at this stage, to get this as  $0.5167$ . So what this tells us is that if  $X$  is greater than  $0.5167$ , then party C can hope to get more votes than party L.

And now thinking back to what  $X$  was,  $X$  was the results of the survey. Right, the fraction of voters in the survey who claim that they will be voting for party C. So what this means is that if the results of the survey revealed that 51.67% of the voters or more right claimed that they plan to vote for party

the survey revealed that 51.67% of the voters or more, right, claimed that they plan to vote for party C, that will make party C happy in the sense that they will anticipate winning the election. So the idea here was to use this framework of an algebraic expression to set up this question, right, as comparing between two algebraic expressions, and then using the inequality to figure out what values of the survey will reveal that party C is more likely to win, and for what values of the survey is it more likely that L is going to win, right? And what this shows us, is that cutoff value is 51.67%, or 0.5167 as a fraction. So that's the beauty of math, that it enables you to very succinctly address a question which is of practical importance. So let's stop this example here. And then we'll pick up with an example from the NBA in the next lecture.