MAGIC SQUARE: HIT AND TRIAL 02

Hello everyone today we are going to write a programme for magic square. In the video you saw amit was trying to solve magic square of size three cross three and was taking a lot of time because he was trying to solve his solve the magic square using brute force way. Which is possible for three cross three square matrix but not possible for let's say five cross five and seven cross seven and even nine cross nine. So we will see that how we can write a programme so that we can solve any kind of magic square in an efficient way, or in an easy way. So we know that in three cross three magic square the sum is actually fifteen so let me revise the rules of magic squares. What you have to do, you have to create let say i give you a number N you have to create a square of size N cross N such that some of each row is m is my magic number, some of each row should be M, sum of each column should be M and even the diagonals, sum of the diagonals should be M. If it happens then you got the magic square, the question is, is it possible to create a magic square for any number N? Let see if i give N is equal to three. So my matrix should become three cross three that is it should have exactly nine elements, N sum of each row should be some M the M could be anything. But it should be unique i mean the sum of each row should be M, each column should be M and the diagonal should be M so we will see how we can do it, how we can create a programme in python so it can solve any kind of magic square. So will tell you that this the size of i mean N can take any number but it should be odd it should not be even and we will write a programme for that. Before that i will encourage you guys to look at the Wikipedia page of magic square it has all the entries regarding magic square and even history of magic square and even the algorithm to solve the magic square i am going to use this algorithm only. To solve to write a programme in python so before i go writing a programme let me tell you some facts ok see you can see here magic square size three and magic square of size five we know that what is the magic square of size three that is two seven six nine five one four three eight if you sum it then each row is becoming fifteen, six plus seven plus two is fifteen, nine plus five plus one is fifteen and even in diagonals sum both the diagonals sum is fifteen. Here is another magic square of size five you can find the sum of each row and each column it will be sixty five so before we go on writing a programme let me tell you some fact. Fact number one is that for any magic square, for any cross any magic square the magic number is always this which is n into n square plus one whole divided by two so let say for three cross three magic square n becomes three so square of three is nine plus one is ten divide by two five into three is fifteen so magic numbers become fifteen and for magic square of size five that is n is five, five square is twenty five, twenty six t which is fifty five oh sorry sixty five sorry. Yeah so we are going to use this fact another thing is that whenever you see the, whenever you see the magic square we will find a pattern here, the pattern is that see the position of one, the position of one is always in the middle a row and last column ok whatever magic square you use, you can even see the magic square of size seven and also you will find in that a middle row. The one is always in the middle row and the last column. So we are going to based on that we are going to use this algorithm we are going to define the algorithm when we are going to use this algorithm to write a program so let's see this. The step number one is

first we have to determine the location of one, so will fix one after that will go on go on to other numbers and will fix their positions and by this will try fitting our numbers and will get our magic square. So first is we know the as i told you in any magic square one is located at the position n by two comma n minus one for any general n cross n matrix square matrix n by two will give me the position of row ok, so for example for three n by two becomes one i am taking the integer number so zero one first row is zero and second row is one third row is two so one is this position and n minus one is the column position which is two so second column so am i position of one is this which is first row and second column. For magic square of size five becomes five by two which is two second row zero first zero one two second row and the last column that is n minus one which is four fourth column we are assuming that always we always assume here that the matrix starts with zero cross zero, zero comma zero sorry. Ok now after determining the position of one will see where where two lies now see here the position of two here also there is a pattern for two also you can see two is here when one is here again the two is here so let's say the position of i take this in the position of one which is n by two comma n minus one as p comma q lets say the position of one is p comma q this is p comma q this is p this is q then next number which is two is located at p minus one comma q plus one oh see this one is at two comma four now if you take p minus one which is two minus one is one and q plus one q is here four, four plus one becomes five now five is not there what is this mean? So let me tell you the second line anytime if the calculated row becomes minus one then make it n minus one and if column position becomes n then make it zero. Here column position is becoming n which is five, five is n so you have to make it zero so it will come zero. So now see my location is p minus one which was two oh sorry one and q plus one which was zero so two zero oh one zero i am sorry so new location is one zero so i will put my two here so like this i will do for calculate for other number also now after this i will calculate for three again using the same thing now the third step is not the step the third fact is if the calculated position always contains the number suppose calculated position i mean already contains a number then decrement the column position by two and increment the row position by one. We will see this how it happens. Now the last fact is if any time the row position becomes minus one and column position becomes n switch it to zero comma n minus two. So i am going to use these three conditions or facts or algorithm say it is not algorithm because i have denitrify the steps these are not steps these are facts only so i am going to use these facts as a condition to write my programme and based on this i will create my magic square so in next video we will see how you can use these steps to create magic square.