

**I'm not a robot!**

View Discussion Improve Article Save Article Like Article Excel Macro is simply a record button that records a set of actions performed on Excel that can be run multiple times. For example, if you have to format some raw data on weekly basis you can use a macro to record yourself formatting the data once and let excel automate the task in the future, it's used to help users save time and avoid performing redundant tasks. In order to record a macro the Developer tab on the ribbon needs to be activated as it isn't by default within Microsoft Excel. The developer tab contains all the macro tools among various other features. To activate it click on the file tab> go to options>Customize Ribbon Under Customize the Ribbon and under Main Tabs, select the Developer check box. (The developer tab stays on the ribbon unless checked off). To record a macro follow these steps: Step 1: click on the view tab, select Macros(extreme right), and hit Record Macro. Step 2: A Record Macro dialog box pops up. The record macro dialog box has 4 sections to be filledMacro name: give a name to your macro (avoid spaces and keep it short) Shortcut Key: you can select any letter to create a shortcut key, be careful not to override an existing shortcut key. (you can press shift and any letter in the box to create a ctrl+shift+letter key) Store macro in: select This workbook to run it only in the current workbook, personal macro workbook so the macro can be used within any workbook on the computer that contains that personal macro workbook and new workbook to run it in a new workbook it creates at the time of recording Description: Here you can provide additional information about the macro(what it does) for the users or ourselves. Step 3: Click ok and Excel will start recording all of your actions henceforth. Step 4: Once done, remember to hit the stop recording button in the lower-left corner of the worksheet or head over to view>Macros>stop recording. Stop recording button bottom left corner. The above steps should help you get started recording a macro. The Visual Basic Editor Excel has a tool called the Visual Basic Editor or VBA that makes note of all the actions you perform while recording a macro in the backend. When you record a macro inside excel through the macro recorder all the code gets stored in a module. To see the code that excel has written head to the Developer tab>code section>Visual Basic this opens up a separate window called the Visual Basic Application window along the left side of this window you will find the module under the project Explorer(if you don't see it click on View>Project Explorer) double click it and all the text is the code that excel generated while recording the macro. Absolute and Relative recording: A macro can be recorded in 2 ways namely Absolute and Relative recording. When you record a macro in Excel it is by default in the Absolute recording mode. In the absolute recording, the steps are performed exactly in the cells the steps were recorded in despite the active cell. In simple words, absolute recording restricts the location of steps. Relative recording executes the steps recorded in any part of the worksheet selected by the user as its relative to the starting location of the macros. To turn on Relative recording head to Developer tab>Code>Use Relative References(gets highlighted in grey when selected) and then start recording the macro. Limitations of an Excel Macro: Macros have certain limitations pertaining to them and can be combated by writing the VBA code manually. Some of them are as follows: A macro doesn't record what options you select within a dialog box. If you need to make any decisions in your process (code), the macro recorder can't help you make them, you can use the IF statement or other conditional statements. The macro recorder can't throw message boxes to prompt the user. Macro-Enabled File Extensions: There are some file extensions that do not store a macro hence you need to be careful about using a macro-enabled format to save your workbook or the macro won't be saved. The default Excel format of the Excel workbook is .xlsx which does not support macros. To store macros you save and open workbooks in a new macro-enabled workbook format .xlsm, this format is the same as .xlsx, but with the capability to support Excel macros. The Excel Binary Workbook(.xlsb) and Excel macro-enabled template(.xltm) are some more file extensions that support macros within them. Steps to save a macro-enabled workbook: Click on the File tab and then choose Save As. The Save As dialog box appears. Enter a name for the and select a location for your workbook. Click the Save as Type drop-down arrow. A list of file types appears. Select Excel Macro-Enabled Workbook. Click on Save. Some more real-time applications of macros can be used to record the creation of charts based on some data, filtering and sorting data, formatting data, or importing it. Definition 1: The Poisson distribution has a probability distribution function (pdf) given by The parameter  $\mu$  is often replaced by the symbol  $\lambda$ . A chart of the pdf of the Poisson distribution for  $\lambda = 3$  is shown in Figure 1. Figure 1 – Poisson Distribution Observation: Some key statistical properties of the Poisson distribution are: Mean =  $\mu$ ; Variance =  $\mu$ ; Skewness =  $1/\mu$ ; Kurtosis =  $1/\mu$ . Excel Function: Excel provides the following function for the Poisson distribution: POISSON.DIST( $x, \mu, \text{cum}$ ) = the probability density function value for the Poisson distribution with mean  $\mu$  if  $\text{cum} = \text{FALSE}$ , and the corresponding cumulative probability distribution value if  $\text{cum} = \text{TRUE}$ . Versions prior to Excel 2010 do not support this function. Versions prior to Excel 2010 support the POISSON function, which is equivalent to POISSON.DIST. Real Statistics Function: Excel doesn't provide a worksheet function for the inverse of the Poisson distribution. Instead, you can use the following function provided by the Real Statistics Resource Pack. POISSON.INV( $p, \mu$ ) = smallest integer  $x$  such that  $\text{POISSON}(x, \mu, \text{TRUE}) \geq p$ . Note that the maximum value of  $x$  is 1,024,000,000. A value higher than this produces an error. Poisson Process: If the average number of occurrences of a particular event in an hour (or some other unit of time) is  $\mu$  and the arrival times are random without any tendency to bunch up (i.e. the assumptions for what is called a Poisson process) then the probability of  $x$  events occurring in an hour is given by Example 1: A large department store sells on average 100 MP3 players a week. Assuming that purchases are as described in the above observation, what is the probability that the store will have to turn away potential buyers before the end of the week if they stock 120 players? How many MP3 players should the store stock in order to make sure that it has a 99% probability of being able to supply a week's demand? The probability that they will sell  $\leq 120$  MP3 players in a week is  $\text{POISSON}(120, 100, \text{TRUE}) = 0.977331$ . Thus, the answer to the first problem is  $1 - 0.977331 = 0.022669$ , or about 2.3%. We can answer the second question by using successive approximations until we arrive at the correct answer. E.g. we could try  $x = 130$ , which is higher than 120. The cumulative Poisson is 0.998293, which is too high. We then pick  $x = 125$  (halfway between 120 and 130). This yields 0.993202, which is a little too high, and so we try 123. This yields 0.988756, which is a little too low, and so we finally arrive at 124, which has cumulative Poisson distribution of 0.991226. Alternatively, you can arrive at the same answer (124) by using the Real Statistics formula =POISSON.INV(0.99,100). Confidence Intervals: The  $1-\alpha$  confidence interval for the mean based on  $x$  events occurring (in a unit of time) is given by where For Excel 2007,  $\chi^2_{p,\text{df}} = \text{CHINV}(1-\alpha, \text{df})$ . See Chi-square Distribution for more details about the CHISQ.INV and CHINV functions. Example 2: Suppose the number of radioactive particles that hits a screen per second follows a Poisson process and suppose that 5 hits occurred in one second, find the 95% confidence interval for the mean number of hits per second. Figure 2 shows the confidence intervals for various values of  $x$  and  $\alpha$ . Figure 2 – Confidence intervals for the Poisson mean: The requested confidence interval is  $1.623486 \leq \mu \leq 11.66833$  as calculated by the formula in cells C9 and D9: =CHISQ.INV(B9/2,2\*A9)/2 =CHISQ.INV.RT(B9/2,2\*(A9+1))/2 Note that CHISQ.INV( $p, 0$ ) = #NUM! for any value of  $p$ , and so we cannot use this formula to calculate the lower bound when  $x = 0$  (cell C4). In any case, this value is zero. Relationship with Binomial and Normal Distributions: Property 1: If the probability  $p$  of success on a single trial approaches 0 while the number of trials  $n$  approaches infinity while the value of  $np$  stays fixed, then the binomial distribution  $B(n, p)$  approaches the Poisson distribution with mean  $\mu = np$ . Click here for the proof of this theorem. Observation: Based on Theorem 1 the Poisson distribution can be used to estimate the binomial distribution when  $n \geq 50$  and  $p \leq .01$ , preferably with  $np \leq 5$ . Example 3: A company produces high precision bolts so that the probability of a defect is 0.05%. In a sample of 4,000 units, what is the probability of having more than 3 defects? The probability is 14.3%. We obtain this probability by using the distribution B(4000, .0005), as follows:  $1 - \text{BINOMDIST}(3, 4000, .0005) = 21 - \text{POISSON}(3, 2, \text{TRUE}) = 1 - 0.857123 = 0.142877$ . As you can see the approximation is quite accurate. Observation: The Poisson distribution can be approximated by the normal distribution, as shown in the following property. Property 2: For  $n$  sufficiently large (usually  $n \geq 20$ ), if  $x$  has a Poisson distribution with mean  $\mu$ , then  $x \sim N(\mu, \sigma^2)$ , i.e. a normal distribution with mean  $\mu$  and variance  $\sigma^2$ . Test for a Poisson Distribution: The index of dispersion of a data set or distribution is the variance divided by the mean. Since the mean and variance of a Poisson distribution are equal, data that conform to a Poisson distribution must have an index of dispersion approximately equal to 1. We can use this fact to test whether a data set has a Poisson distribution, as described in Goodness of Fit. In fact in Goodness of Fit, we also show how to use the chi-square goodness-of-fit test to determine whether a data set follows a Poisson distribution. Difference between Two Poisson Distributions: If  $x$  and  $y$  are two independent Poisson distributed random variables, then  $x - y$  has a Skellam distribution as described at Skellam Distribution. Reference Wikipedia (2012) Poisson distribution

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