

# What is the difference between Binomial Probability Distribution Function (BinomPDF) and Binomial Cumulative Distribution Function (BinomCDF)?

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Binomial Probability Distribution Function (BinomPDF) and Binomial Cumulative Distribution Function (BinomCDF) are two types of probability distribution functions commonly used in statistics to model the likelihood of a certain event occurring.

The Binomial Probability Distribution Function (BinomPDF) calculates the probability of obtaining a specific number of successes in a fixed number of independent trials, given a certain probability of success for each trial. It is represented by the formula  $P(x;n,p) = {}^n C_x * p^x * (1-p)^{(n-x)}$ , where  $x$  is the number of successes,  $n$  is the number of trials, and  $p$  is the probability of success.

On the other hand, the Binomial Cumulative Distribution Function (BinomCDF) calculates the probability of obtaining a number of successes less than or equal to a specific value in a fixed number of independent trials. It is represented by the formula  $P(x \leq k;n,p) = \sum_{i=0}^k ({}^n C_i) * p^i * (1-p)^{(n-i)}$ , where  $k$  is the desired number of successes.

An example of Binomial Probability Distribution Function would be calculating the probability of getting exactly 2 heads when flipping a fair coin 5 times, given that the probability of getting a head is 0.5. On the other hand, an example of Binomial Cumulative Distribution Function would be calculating the probability of getting 2 or less heads when flipping a fair coin 5 times, given the probability of getting a head is 0.5.

In summary, Binomial Probability Distribution Function and Binomial Cumulative Distribution Function are both useful tools for calculating the likelihood of certain events occurring in a fixed number of independent trials, but they differ in the specific values they calculate and the types of questions they can answer.

## BinomPDF vs BinomCDF: The Difference (Plus Examples)

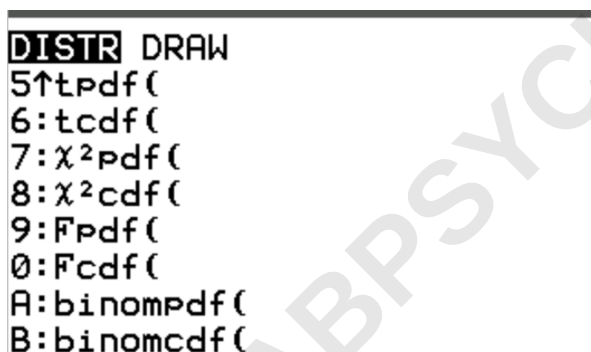
**The is one of the most commonly used distributions in all of statistics.**

**On a TI-84 calculator there are two functions you can use to find probabilities related to the binomial distribution:**

**binompdf( $n$ ,  $p$ ,  $x$ ):** Finds the probability that exactly  $x$  successes occur during  $n$  trials where the probability of success on a given trial is equal to  $p$ .

**binomcdf( $n$ ,  $p$ ,  $x$ ):** Finds the probability that  $x$  successes or fewer occur during  $n$  trials where the probability of success on a given trial is equal to  $p$ .

You can access each of these functions on a TI-84 calculator by pressing 2nd and then pressing VARS. This will take you to a DISTR screen where you can then use binompdf() and binomcdf():



A screenshot of the TI-84 calculator's DISTR (Distribution) screen. The screen shows a list of statistical functions with their corresponding second function keys. The options are: 5: tPdf(, 6: tcdf(, 7:  $\chi^2$ pdf(, 8:  $\chi^2$ cdf(, 9: Fpdf(, 0: Fcdf(, A: binompdf(, and B: binomcdf(. The 'B' option for binomcdf( is highlighted with a cursor.

The following examples show how to use each of these functions in practice.

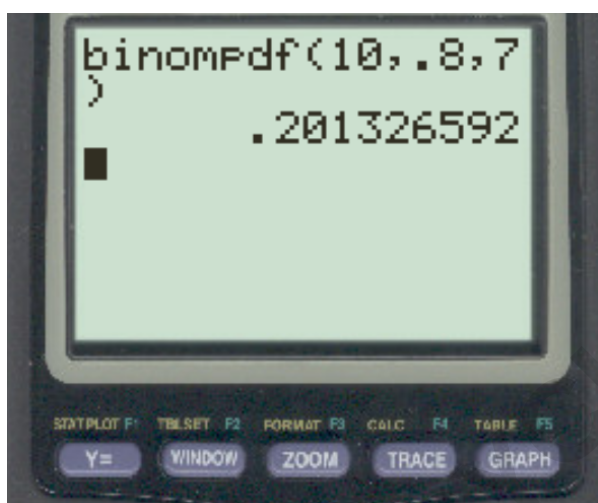
Examples: How to Use Binompdf()

The following examples show how to use the binompdf() function.

## Example 1: Free-Throw Attempts

Jessica makes 80% of her free-throw attempts. If she shoots 10 free throws, what is the probability that she makes exactly 7?

To answer this, we can type in the following formula:

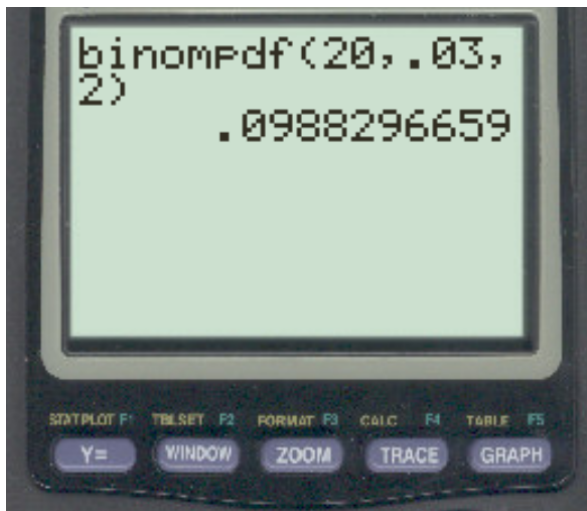


The probability that she makes exactly 7 is .2013.

## Example 2: Fraudulent Transactions

A bank knows that 3% of all transactions are fraudulent. If 20 transactions occur in a given day, what is the probability that exactly 2 are fraudulent?

To answer this, we can type in the following formula:



### Examples: How to Use Binomcdf()

The following examples show how to use the binomcdf() function.

#### Example 1: Free-Throw Attempts

Jessica makes 50% of her free-throw attempts. If she shoots 10 free throws, what is the probability that she makes 7 or less?

To answer this, we can type in the following formula:

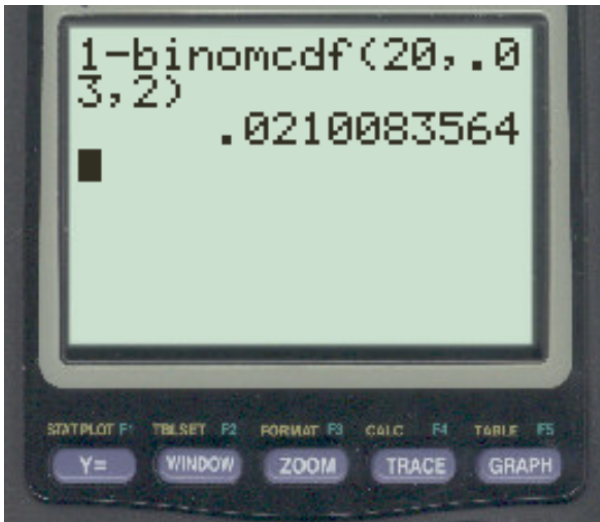


The probability that she makes 7 or less free throws is .9453.

### Example 2: Fraudulent Transactions

A bank knows that 3% of all transactions are fraudulent. If 20 transactions occur in a given day, what is the probability that more than 2 transactions are fraudulent?

To answer this, we can type in the following formula:



**The probability that more than 2 transactions are fraudulent is .021.**