

Binomial Distributions

Name: _____

Per: _____

Date: _____

GETTING READY

- A) Open the Statistics Application (I).
- B) Select **Edit** and then **Clear All**.
- C) If there is something already open in Statistics, make sure you save it if you want to keep it. If not, select **OK** when prompted with the **Clear All** menu.

INTRODUCTION

There are two types of binomial distributions. One is the **probability density** function and one is the **cumulative distribution** function.

Example: If you want to find the probability of exactly seven events occurring, use the probability density function. However, if you want to find the probability of more or less than seven events occurring, use the cumulative distribution function.

NOTE: In order to use the binomial distribution, all events must be independent.

THE SITUATION:

A basketball player makes 75% of her free throw shots. During one particular game, she attempts 12 free throw shots and misses 5 of the 12. All of her free throw shots are independent and the probability that she makes a single free throw is 0.75.

What is the probability that she will miss exactly 5 free throws in a game?

What is the probability that she will miss 5 or more free throws in a game?

(Source: Introduction to the Practice of Statistics, 6th ed., Moore, McCabe, & Craig, 2009.)

ON THE CLASSPAD

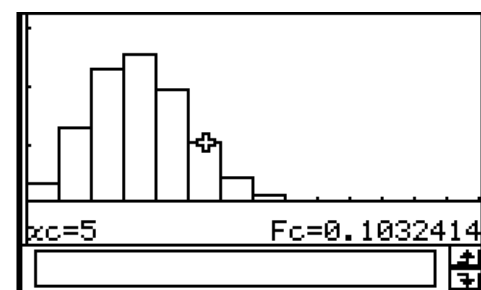
To answer the first question, we need to use a Binomial Probability Density function because we need to know the probability of an exact number. For the second question, we need to use the Binomial Cumulative Distribution function because we need to know the probability of more than a certain number of events occurring.

1) Select **Calc, Distribution** from the menu. This will open a dialog box. In the second dropdown menu within the dialog box, select **Binomial PD** and tap **Next**.

2) Enter in the following information. The box for **x** is the number of free throws she will miss, the **Numtrial** box is where the total number of free throw attempts should be entered. The **pos** box is where the probability of missing an individual free throw should be entered. Tap **Next**.

3) We get a probability of 0.1032414. What does this mean?

4) Now tap \$ in the upper left corner of the menu. Describe the graph and what it means with regard to the data in your own words.



5) Now, use the ClassPad to answer the second question. **HINT: To start, select [Calc, Distribution](#) from the menu. In the dialog box that opens, select [Binomial CD](#). You will need to enter in Lower and Upper bounds. Remember you are working with a total of 12 free throws.**

6) Interpret your results. Make sure to use information from the resulting graph to support your results.

ON YOUR OWN

Use the ClassPad to answer the questions about these next three situations. **In the results boxes, talk about your results, and make sure to support your statements. Graph each one, and use your graphing results to help you.**

SITUATION ONE

A basketball player *misses* 30% of her free throw shots in a typical game. During one particular game, she attempts 17 free throw shots and misses 7 of the 17. All of her free throw shots are independent and the probability that she *makes* a single free throw is 0.70.

What is the probability that she will miss exactly 7 free throws in a game?

What is the probability that she will miss 7 or more free throws in a game?

RESULTS:

SITUATION TWO

You toss a coin 50 times.

What is the probability of obtaining exactly 20 heads?

What is the probability of obtaining 20 or fewer heads?

RESULTS:

SITUATION THREE

A student who did not study is taking a test. This student must answer seven multiple choice questions that each have five possible answers. The student guesses on each question.

What is the probability that the student answers exactly 3 questions correctly?

What is the probability that the student answers more than 3 questions correctly?

RESULTS: