**Binomial Probability Distributions**

A binomial probability distribution is useful when dealing with two outcomes. Here is the definition of a binomial distribution.

**Definition**

A **binomial probability distribution** occurs when the following requirements are met.

1. The procedure has a fixed number of trials.
2. The trials must be independent.
3. Each trial must have all outcomes that fall into two categories.
4. The probabilities must remain constant for each trial.

There are many ways to compute *P(x)* when dealing with a binomial probability distribution. The TI-83 has this capability built in. In order to use the TI-83, some notation will be needed.

**Notation for binomial probability distribution**

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| --- | --- |
| *n* | denotes the number of fixed trials |
| *x* | denotes the number of successes in the n trials |
| *p* | denotes the probability of success |
| *q* | denotes the probability of failure (1-p) |

**How to use the TI-83 to get the probabilities for a binomial probability distribution**

1. Press **2nd VARS**.
2. Select the option **binompdf(**.
3. **binompdf(*n, p, x*)**, with the appropriate values substituted in.

**Flipping coins**

What is the probability of getting exactly 2 heads when 4 tosses are made?

**Solution:** Using the TI-83 with **binompdf(*4, .5, 2*)**, it follows that the probability for getting 2 heads on 4 throws is .375.

**Flipping coins (cont.)**

What is the probability of getting at least 2 heads in 4 throws?

**Solution:** To satisfy the condition, 2, 3 or 4 heads must be thrown. These events are independent, so the probabilities can be added together to find the total probability. Using the binomial probability distribution for *x = 2, 3, 4*, the probability of at least 2 heads is .3750 + .2500 + .0625 = .6875.