

### 3.5 Geometric Probability Distribution using Excel Spreadsheet

#### How to use Excel function for Geometric

Suppose the probability that a red car enters an intersection is 0.24. What is the likelihood that the first red car enters the intersection after four non-red vehicles pass through the intersection? The discrete probability distribution is Geometric.

$$P(\text{Red Car}) = .24$$

$$P(\text{Not Red Car}) = 1 - .24 = .76$$

$$P(X = 5) = (.76)^4(.24) = 0.0801 \text{ Rounded to 4 decimal places}$$

To compute the probability in an Excel spreadsheet, enter the formula below.

**=NEGBINOM.DIST(4, 1, 0.24, FALSE)**

- 4 represents the four non-red cars that have entered the intersection before the red car.
- 1 represents the first red car that enters the intersection.
- 0.24 is the probability of a red car entering the intersection.
- False means you want to compute a probability for one value,  $P(X = 5)$ .
- True means you want to compute the  $P(X \leq 5)$ .

**The answer you should see is 0.080069. Rounded to four decimal**

You can also enter the following formula for one probability

$$= (.76^4) * .24$$

To make sure the formula is calculated, hit the Enter key after entering the formula.

#### Example 1

Next, find the probability that at most 4 white cars pass through the intersection during one hour.

#### Solution

The probability statement is  $P(X \leq 4)$ . The Excel function is **=NEGBINOM.DIST(3, 1, 0.24, True)** . **The answer is 0.6664 rounded to 4 decimal places.**