

FOR THIS PAGE USE PROB RULES OR CALC COMMAND

Example: Monopoly (continued)

The random variable of interest is:

$Y = \text{number of attempts it takes to roll doubles one time}$

(g) Find the probability that it takes more than 4 turns to roll doubles and interpret this value in context. Since there are an infinite number of possible values of Y greater than 4 (i.e. 5, 6, 7, etc.), we will use the complement rule.

Prob. Rules (OR)

$$P(Y > 4) = 1 - P(Y \leq 4)$$

OR

$$1 - [P(Y=1) + P(Y=2) + P(Y=3) + P(Y=4)]$$

$$1 - [1/6 + 0.139 + 0.116 + 0.096] = 0.482$$

Calc Commands

$$P(Y > 4) = 1 - P(Y \leq 4)$$

$$1 - 0.518 = 0.482$$

$$\text{geomcdf}(1/6, 4)$$

p ↑ x

INTERPRET

There is about a 48% chance of getting your 1st doubles after the 4th roll.

(h) In Monopoly, a player can get out of jail rolling doubles with in 3 turns, Find the probability and interpret this value in context.

USING PROB RULES

$$P(Y \leq 3) = P(Y=1) + P(Y=2) + P(Y=3)$$

$$= 1/6 + 0.139 + 0.116$$

$$= 0.422$$

USE CALC COMMANDS

$$P(Y \leq 3) = 0.423$$

$$\text{geomcdf}(1/6, 3)$$

INTERPRET

There is about a 42% chance that you will get doubles in your 1st 3 tries.

II. Parameters, Mean and Standard Deviation for Geometric Models

1) What parameter(s) are required to describe a Geometric Model

• state model w/parameters → $G(1/6)$ parameter p ...

2) From the green sheet write down the formulas Geometric Mean and Standard Deviation

$$E(x) = \mu_x = \frac{1}{p}$$

$$SD(x) = \sigma_x = \frac{\sqrt{1-p}}{p}$$

3) For the Monopoly example, find the Mean and Standard Deviation

$$\mu_y = 1/1/6 = 6$$

$$\sigma_y = \frac{5/6}{1/6} = 5$$

IN THE LONG RUN, the mean # of rolls to get 1st doubles is about 6 rolls and would vary from the mean by 5 rolls on average

III. Using the Calculator to find Geometric Probabilities

Example: Monopoly(cont.)

You may also calculate geometric probabilities with your calculator. However you **MUST ALWAYS:**

(1) define RV [$Y = \text{number of attempts it takes to roll doubles one time}$] (2) state model w/parameters $G(1/6)$.

a) Explain what the difference between "geompdf" and "geomcdf"

geom Pdf is for a specific value of x

geom Cdf is the cumulative probability up to the value x

b) Find the probabilities for a SPECIFIC VALUE using the calc.

• $P(Y=4) = \text{geompdf}(1/6, 4) = 0.096$

c) Find a CUMULATIVE probability using the calc.

• $P(Y \leq 4) = \text{geomcdf}(1/6, 4) = 0.5177$

• $P(Y < 4) = \text{geomcdf}(1/6, 3) = 0.4213$

• $P(Y > 5) = 1 - \text{geomcdf}(1/6, 5) = 0.4019$