QUIZ 5
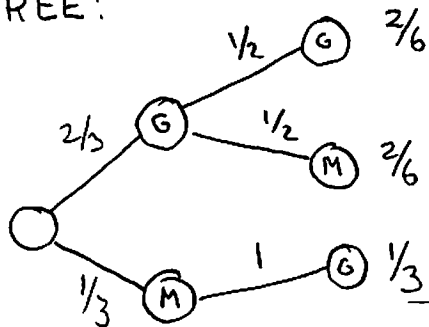
NAME: _____

1) A box contains 2 guavas and 1 mango. Someone selects 2 of the 3 fruit at random, one after the other, without replacement. Let X = number of guava selected.

a) (20 PTS.) Fill in the blanks for the table shown below for the probability density function of X. (That is, find $Pr[X=1]$, $Pr[X=2]$.)

① TREE:

Use ① or ②.

	$(X=1)$	$(X=2)$
$\frac{2}{6}$		X
$\frac{2}{6}$	X	
$\frac{1}{3}$	X	
	$\frac{2}{3}$	$\frac{1}{3}$

Value of X	Probability
1	$\frac{2}{3}$
2	$\frac{1}{3}$

② COMBINATIONS:

$$Pr[X=1] = Pr(1G + 1M) = \frac{2 \cdot 1}{C(3,2)} = \frac{2}{3} \quad \leftarrow \text{# WAYS TO PICK } 1G + 1M$$

$$Pr[X=2] = Pr(2G) = \frac{1}{C(3,2)} = \frac{1}{3}$$

b) (10 PTS.) Find $E(X)$.

$$E(X) = 1 \cdot \frac{2}{3} + 2\left(\frac{1}{3}\right) = \frac{4}{3}$$

Cheap risky way: Put 2 guavas + 1 mango (all equal size) in a blender. Mix + pour out 2 glasses (each glass holds 1 fruit). Each glass will be $\frac{2}{3}$ G and $\frac{1}{3}$ M. Two glasses will hold $2 \cdot \frac{2}{3}$ G $\Rightarrow \frac{4}{3}$.

Sort of like Bernoulli, but it is not a Bernoulli process.

Answer: $E(X) = \underline{\frac{4}{3}}$

2) (15 PTS.) A box contains 2 guavas and 1 mango. Someone selects one of the fruit at random and <u>replaces</u> it. This process is repeated three more times for at total of 4 selections. Let Y = total number of guava selected.

a) (15 PTS.) Find $Pr(Y = 2)$.

$$Pr(Y=2) = Pr(2G + 2M \text{ any order})$$

$$= \underbrace{C(4,2)}_{\text{From the 4 selections choose 2 for guavas.}} \left(\tfrac{2}{3}\right)^2 \left(\tfrac{1}{3}\right)^2$$

$$= 6 \,\frac{4}{81} = \tfrac{24}{81}$$

Answer: $Pr(Y = 2) = \underline{\tfrac{24}{81}}$

b) (5 PTS.) Find $E(Y)$.

Bernoulli:

$$E(X) = np = 4 \cdot \tfrac{2}{3} = \tfrac{8}{3}$$

Answer: $E(Y) = \underline{\tfrac{8}{3}}$