M118
FALL 2000

QUIZ 10

NAME: _____

Instructions: Express your answers below as fractions in lowest terms. For example, $\frac{11}{17}$.

1) A box contains 5 guavas and 2 mangos. Someone selects 3 of the 7 fruit at random. Let X = number of guava selected. (Note that **3** fruit are being selected, NOT 2 as on the quiz given on the web.)

a) (25 PTS.) Fill in the blanks for table shown below for the probability density function of X. (That is, find $Pr[X = 1]$, $Pr[X = 2]$, and $Pr[X = 3]$.)

$\binom{7}{3} = \frac{7!}{4!3!} = \frac{7 \cdot 6 \cdot 5}{3!} = 35$

$Pr(X=1) = Pr(1G + 2M) = \frac{\binom{5}{1}\binom{2}{2}}{\binom{7}{3}} = \frac{5 \cdot 1}{35} = 1/7$

$Pr(X=3) = \frac{\binom{5}{3}}{\binom{7}{3}} = \frac{\frac{5 \cdot 4}{2}}{35} = \frac{10}{35} = 2/7$

$1 - (0 + 1/7 + 2/7) = 4/7 = Pr(X=2)$

Value of X	Probability
0	0
1	1/7
2	4/7
3	2/7

b) (15 PTS.) Find $E(X)$.

$0 \cdot 0 + 1 \cdot 1/7 + 2 \cdot 4/7 + 3 \cdot 2/7 = 15/7$

Answer: $E(X) =$ 15/7

c) (10 PTS.) Let Y = number of guava selected minus the number of mango selected. Find $E(Y)$. Hint: Y takes on the values $0 - 3 = -3$, $1 - 2 = -1$, $2 - 1 = 1$, and $3 - 0 = 3$.

$0 \cdot (0-3) + 1/7 (1-2) + 4/7 (2-1) + 2/7 (3-0)$

$= -1/7 + 4/7 + 6/7 = 9/7$

Answer: $E(Y) =$ 9/7