ECEN4503 Quiz #2 5 February 2010 Name Solution

1) Suppose the P(a mother has a boy) = P(a mother has a girl) = 0.5 and that in subsequent births the sex is statistically independent. You randomly pick a family with two children.
1a) [2] **Compute** P(this family has 1 boy and 1 girl).
1b) [1] **Compute** P(the second child is a boy | first child is a girl).
1c) [2] **Compute** P(the other child is a boy | one child is a girl).

Two children ⇒ 4 equally likely combos:

1ST \ 2ND	B	G
B	.25	.25
G	.25	.25

1A) $P(1\text{ BOY} \cap 1\text{ GIRL}) = 2/4 = 1/2$ ANS

1B) $P(\#2 \text{ is } B \mid \#1 \text{ is } G) = 1/2$ ANS

1C) $P(\text{other is } B \mid \text{one is a girl}) = 2/3$ ANS

Comment: # boys impacts # of girls ⇒ #'s are NOT S.I.

2) Suppose that when a baseball player gets a hit and safely reaches base, a 1 base hit is twice as likely as a 2 base hit, which is twice as likely as a 3 base hit, which is twice as likely as a 4 base hit. The probability the player gets a hit is 0.3, and the probability the player makes an out (equivalent to a 0 base hit) is 0.7. Define a random variable X to be the number of bases the player reaches.
[5] **Sketch** $f_X(x)$.

4B = 1 $P(4B \mid HIT) = 1/15$
3B = 2 $P(3B \mid HIT) = 2/15$
2B = 4 $P(2B \mid HIT) = 4/15$
1B = 8 $P(1B \mid HIT) = 8/15$

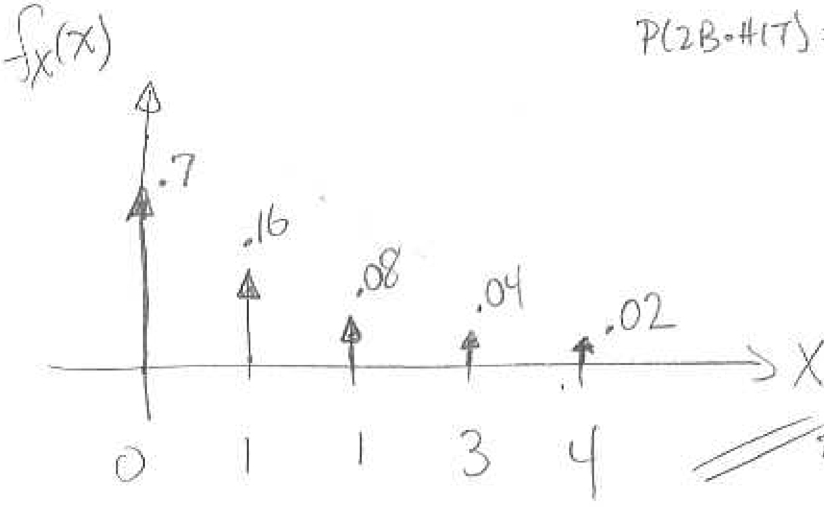
$\Rightarrow P(1B \cdot HIT) = P(HIT)\,P(1B \mid HIT)$
$= .3(8/15) = .24/15 = .016$

$P(2B \cdot HIT) = \cdots = .3(4/15) = .08$

$P(3B \cdot HIT) = .04$

$P(4B \cdot HIT) = .02$

$\Sigma = 0.30$



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