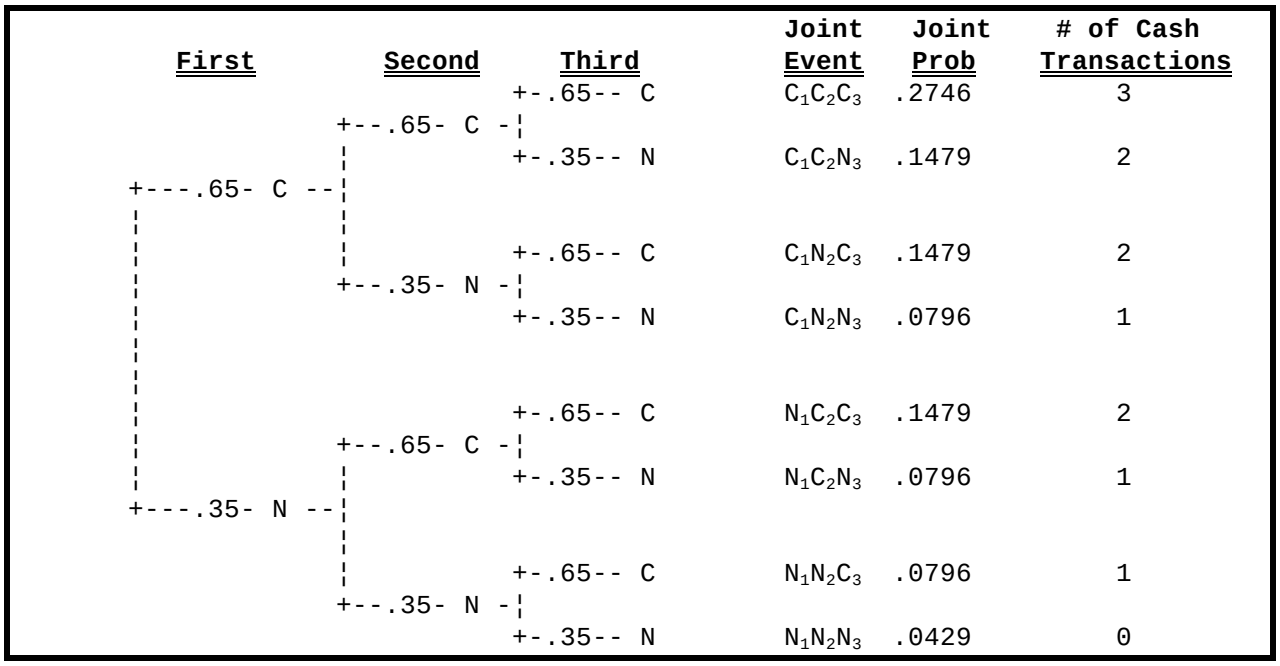
GBS 221 Chapter 5 Worksheet 4
Trollen Binomial Probabilities

SCENARIO

A convenience store finds that customers pay for their purchases with cash in 65% of its transactions. The remaining 35% are non-cash transactions (debit cards, credit cards, and checks). The probability tree below depicts the possibilities for three transactions, where **C** denotes a cash transaction and **N** denotes a non-cash transaction.



In the probability tree above, notice that:

- there is only one way to end up with **three** cash transactions;
- there are three different ways to end up with **two** cash transactions, and each has the same probability (.1479) of occurring;
- there are three different ways to end up with **one** cash transaction and that each has the same probability (.0796) of occurring;
- there is only one way to end up with **zero** cash transactions.

If we let X denote the number of cash transactions, the following *probability distribution* can be constructed:

X	P(X)	
0	.0429	
1	.2388	(.0796+.0796+.0796)
2	.4437	(.1479+.1479+.1479)
3	.2746	
Total	**1.000**	

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Refer to the convenience store example. Use the formulas provided in Chapter 5 (pg 210) and in the class notes for the *expected value* and *variance* of a discrete probability distribution, complete the following items. Show all work including plugging into formulas. Carry calculations to 4 decimal digits.

X (Cash transactions)	P(X)
0	.0429
1	.2388
2	.4437
3	.2746
Total	**1.000**

a) What is the *expected value* of the number of cash purchases during three transactions?

b) What is the *variance* of the number of cash purchases during three transactions?

c) Sketch the probability distribution.

d) Use the Binomial formula to compute the following probabilities. Show your work here.

$P_B(X=0 \mid n=3, p=.65) =$

$P_B(X=1 \mid n=3, p=.65) =$

$P_B(X=2 \mid n=3, p=.65) =$

$P_B(X=3 \mid n=3, p=.65) =$