CSCI 305 HW 7

Isaac Boaz

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1. Coinflips.

   a.
   $$\{(0,0,0),(1,0,0),(0,1,0),(0,0,1),(1,1,0),(0,1,1),(1,0,1),(1,1,1)\}$$

   b.

y	ways	$P[Y=y]$
0	TTT	1/8
1	HTT, THT, TTH	3/8
2	HHT, THH, HTH	3/8
3	HHH	1/8

   c.
   $$0 \times \frac{1}{8} + 1 \times \frac{3}{8} + 2 \times \frac{3}{8} + 3 \times \frac{1}{8} = \frac{3}{2}$$

   d. It would not make sense for a single coinflip to effect the probability of future coinflips, logically, this means X_1, X_2, X_3 must be independent.

   e.
   $$E[X_1] = \frac{1}{2}$$
   $$E[X_2] = \frac{1}{2}$$
   $$E[X_3] = \frac{1}{2}$$

   $$E[X_1]E[X_2]E[X_3] = (\frac{1}{2})^3 = \frac{1}{8}$$

   We see that this matches with $E[X_1X_2X_3]$, thus X is indeed independently random.