Probability Spaces
and
Tree Diagrams

The data table below gives data for 103,870 women on their current and past marital status.

If one of these women were chosen at random, the probability of finding a married woman between the ages of 18 and 29 is…

P(18-29 & Married) = 7,842/103,870 ≈ .0755

Age and marital status of women in the U. S. (thousands)

	Age			
	18-29	**30-64**	**65 and over**	**Total**
Married	7,842	43,808	8,270	59,920
Never Married	13,930	7,184	751	21,865
Widowed	36	2,523	8,385	10,944
Divorced	704	9,174	1,263	11,141
Total	22,512	62,689	18,669	103,870

Source: Data for 1999 from the 2000 Statistical Abstract of the U.S.

P(Widow who is 65 and over) = **8,385/103,870** = 0.081

P(Married) = **59,920/103,870** = 0.577

P(30-64 years old) = **62,689/103,870** = 0.604

P(Divorced or 18-29) = 32,949/103,870 ???

P(Never married or 65 and over) =

$$\begin{array}{rr} & 11{,}141 \\ + & 22{,}512 \\ - & 704 \\ \hline & 32{,}949 \end{array}$$

704 is contained in both 11,141 and 22,512 so we have to subtract one

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P(Divorced or 18-29) = 32,949/103,870 ???

P(Never married or 65 and over) = 39,783/103,870

$$\begin{array}{rr} & 21{,}865 \\ + & 18{,}669 \\ - & 751 \\ \hline & 39{,}783 \end{array}$$

751 is contained in both 18,669 and 21,865 so we have to subtract one

Age and marital status of women in the U. S. (thousands)

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Source: Data for 1999 from the 2000 Statistical Abstract of the U.S.

Suppose you are choosing at random from only the married women

P(Age 30-64 | Married Women) = 43,808/59,920

This symbol represents *conditional probability*…to be continued

Age and marital status of women in the U. S. (thousands)

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	18-29	**30-64**	**65 and over**	**Total**
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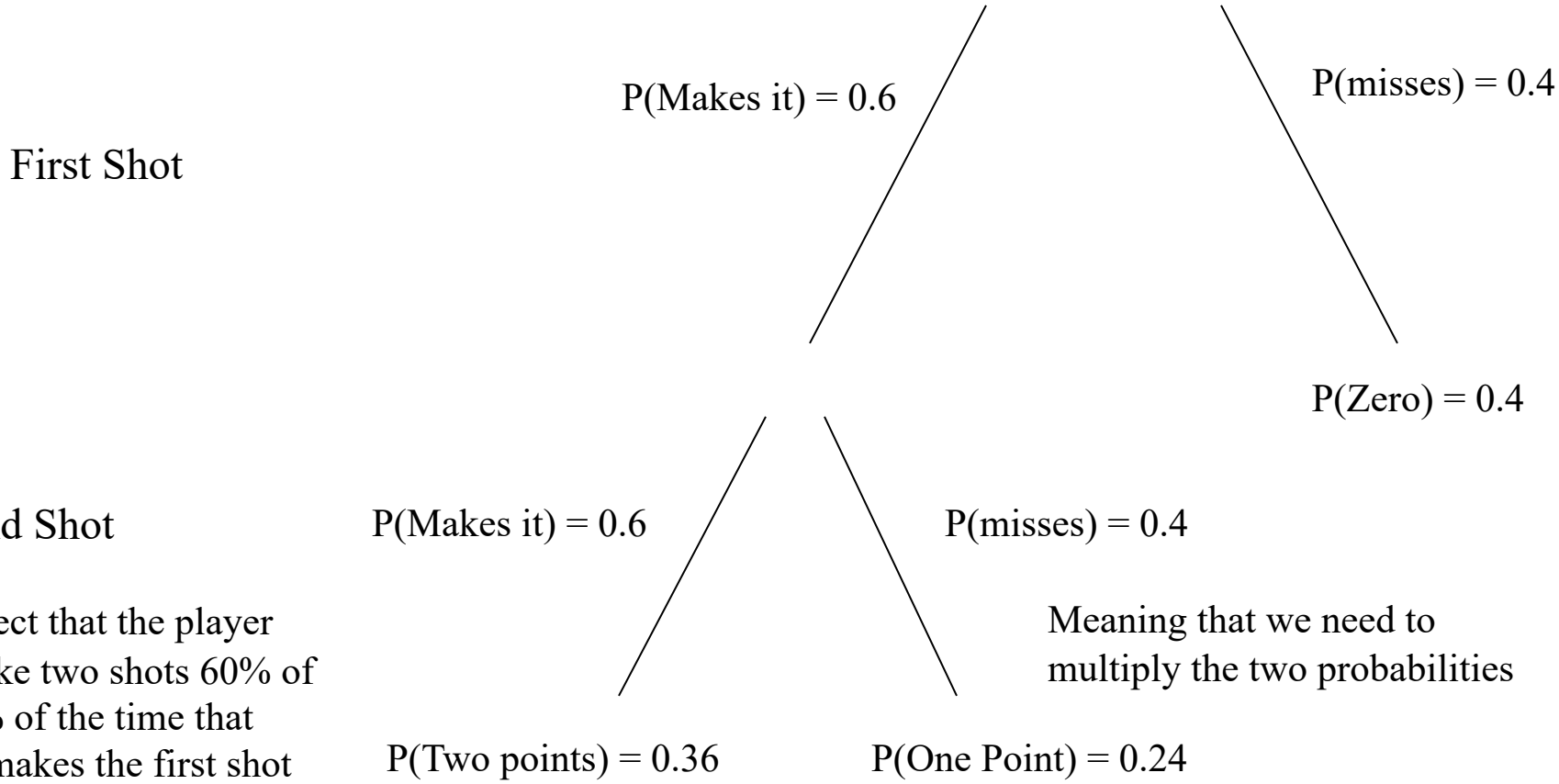
Source: Data for 1999 from the 2000 Statistical Abstract of the U.S.

Now let's revisit the one and one situation: A player with a free throw percentage of 60% goes to the line for a one and one. If he/she makes the first shot, he/she gets a second. If he/she misses the first shot, the ball is live. What is the most likely outcome: Zero, One point, or Two points.

To do this, make a tree diagram:



We expect that the player will make two shots 60% of the 60% of the time that he/she makes the first shot

Meaning that we need to multiply the two probabilities