## Probability Spaces

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...
$\mathrm{P}(18-29$ \& Married $)=7,842 / 103,870 \approx .0755$
TABLE 6.1 Age and marital status of women (thousands of women)

|  | 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 |

[^0]$\mathrm{P}($ Widow who is 65 and over $)=8,385 / 103,870=$

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P(Married) = 59,920/103,870 =
P(30-64 years old ) = 62,689/103,870
P(Divorced or 18-29) = 32,949/103,870 But how?
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$\mathrm{P}($ Never married or 65 and over $)=39,783 / 103,870$

|  | 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 |

Suppose you are choosing at random from only the married women
$P($ Age 30-64 $)=43,808 / 59,920=$

|  | 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 |

G = Gianna is late for Stats Class

## What event does this region represent? <br> What do these represent?



Sample Space

## A little bit of probability notation:

$P(G)=$ Probability that Gianna will be late for class
$\left.\mathbf{P}\left(\mathbf{G}^{\mathbf{C}}\right)=\mathbf{P ( n o t} \mathbf{G}\right)=$ Probability that Gianna is not late for class


The subscript C stands for the complement of $P(G)$ which means the opposite of $\mathbf{G}$ occurs
$\mathbf{P ( S )}=$ Probability that Sydney will be late for class
$\mathbf{P}\left(\mathbf{S}^{\mathbf{C}}\right)=\mathbf{P}($ not $\mathbf{S})=$ Probability that Sydney is not late for class

## $\mathbf{P}(\mathbf{G})=0.4 \quad \mathbf{P}(\mathbf{S})=0.3 \quad \mathbf{P}(\mathbf{G} \& \mathbf{S})=0.12 \quad \mathbf{P}\left(\mathbf{G} \& \mathbf{S}^{\mathbf{C}}\right)=\mathbf{P}(\mathbf{G} \&$ not $\mathbf{S})=0.28$

$\mathbf{P}\left(\mathbf{S} \& \mathbf{G}^{\mathbf{C}}\right)=\mathbf{P}(\mathbf{S} \&$ not $\mathbf{G})=0.18 \quad \mathbf{P}(\mathbf{N})=\mathbf{P}\left(\mathbf{G}^{\mathbf{C}} \& \mathbf{S}^{\mathbf{C}}\right)=0.3$


Sample Space
$\mathbf{P}(\mathbf{G}$ not $\mathbf{S})=0.28$
$\mathbf{P}(\mathbf{G} \& \mathbf{S})=0.07$
$\mathbf{P}(\mathbf{G})=0.35$

$$
\mathbf{P}(\mathbf{S})=0.2 \quad \mathbf{P}\left(\mathbf{S} \& \mathbf{G}^{\mathbf{C}}\right)=\mathbf{P}(\mathbf{S} \text { not } \mathbf{G})=0.13 \quad \mathbf{P}(\mathbf{N})=\mathbf{P}\left(\mathbf{G}^{\mathbf{C}} \& \mathbf{S}^{\mathbf{C}}\right)=0.45
$$



Sample Space


[^0]:    Source: Data for 1999 from the 2000 Statistical Abstract of the United States.

