# 4.6    Independence

## Study Ch. 4.6, p. 202 # 115,119

**Class Notes:  Prof. G. Battaly, Westchester Community College, NY**

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Class Notes

Conditional Probability Rule:

If A and B are any two events with P(A) > 0,

then    $P(B/A) = \dfrac{P(A\&B)}{P(A)}$

The probability that event B occurs,
under the condition that
**it is given that event A has occurred**.

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INDEPENDENT EVENTS:

Event B is INDEPENDENT of event A
if:

also:

$$P(B/A) = P(B)$$

$$P(A/B) = P(A)$$

Two events are independent if:
the **occurrence of one does not change the**
**probability of the occurrence of the other**.

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| | Location of injury | | | |
|---|---|---|---|---|
| | Work | Home | Other | Total |
| Male | 8 | 9.8 | 17.8 | 35.6 |
| Female | 1.3 | 11.6 | 12.9 | 25.8 |
| Total | 9.3 | 21.4 | 30.7 | 61.4 |

Find:
a)  P(Work)
b)  P(work/female)
c)  Are having an injury at work and being a female independent events?  Why?
d)  Is the event that an injured person is male independent of the event that an injured person was hurt at home?

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a) $P(W) = \dfrac{9.3}{61.4} = 0.151$

b) $P(W/F) = \dfrac{1.3}{25.8} = 0.050$

c) W, F independent?

$P(W) = 0.151 \neq 0.050 = P(W/F)$
DEPENDENT

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M, H    dependent or independent?

$$P(H/M) \overset{?}{=} P(H) \quad \Big|\Big| \quad P(M/H) \overset{?}{=} P(M)$$

$$P(H) = \frac{21.4}{61.4} = 0.349 \quad \Big|\Big| \quad P(H) \neq P(H/M)$$

$$P(H/M) = \frac{9.8}{35.6} = 0.275 \quad \therefore H \text{ and } M \text{ are}$$

$$P(H/M) = 0.275 \neq 0.349 = P(H) \quad \text{dependent}$$

not independent

p. 204 #120

roll 2 dice

6 · 6 = 36
equally likely.

A = red, even
B = black, odd.

Are A, B independent?

$P(A/B) = P(A)$   independent.

$P(A) = \frac{3}{6} = \frac{1}{2}$

$P(A/B) = \frac{3}{6} = \frac{1}{2}$

$P(A/B) = P(A)$

∴ A, B INDEPEN