

Statistics
Fall 2021
Lecture 11



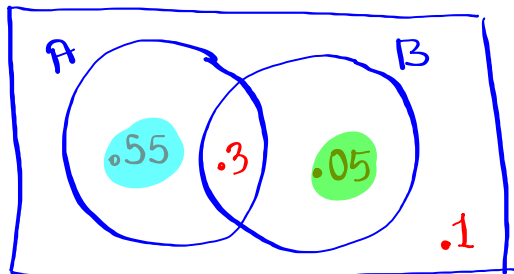
class QZ 11

Given $P(A) = .85$ ✓

$P(B) = .35$ ✓

$P(A \text{ and } B) = .3$ ✓

$.85 - .3 = .55$, $.35 - .3 = .05$



Total = 1

Find

1) $P(\bar{A}) = 1 - P(A) = \boxed{.15}$ ✓

2) $P(A \text{ or } B)$

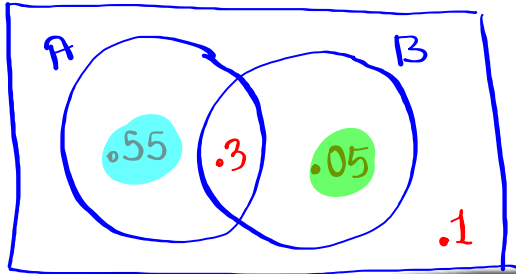
$= P(A) + P(B) - P(A \text{ and } B)$

$= .85 + .35 - .3$

$= \boxed{.9}$ ✓

$P(\text{A only or B only})$

$= .55 + .05 = \boxed{.6}$



$$\begin{aligned}
 P(\bar{A} \text{ and } \bar{B}) &= P(\overline{A \text{ or } B}) \\
 &= 1 - P(A \text{ or } B) \\
 &= 1 - .9 \\
 &= \boxed{.1}
 \end{aligned}$$

De Morgan's Law:

$$P(\bar{A} \text{ and } \bar{B}) = P(\overline{A \text{ or } B})$$

$$P(\bar{A} \text{ or } \bar{B}) = P(\overline{A \text{ and } B})$$

$$P(\bar{A} \text{ or } \bar{B}) =$$

$$P(\overline{A \text{ and } B}) =$$

$$1 - P(A \text{ and } B) =$$

$$1 - .3 = \boxed{.7}$$

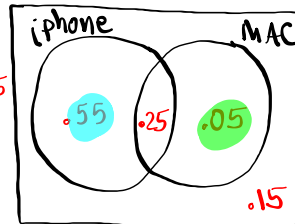
$$P(\text{iPhone}) = .8$$

$$.8 - .25 = .55$$

$$P(\text{MAC laptop}) = .3$$

$$.3 - .25 = .05$$

$$P(\text{iPhone and MAC laptop}) = .25$$



$$P(\text{iPhone only OR MAC only}) = .55 + .05 = \boxed{.6}$$

Total = 1

$$P(\overline{\text{iPhone and MAC}}) = P(\overline{\text{iPhone OR MAC}})$$

De Morgan's Law

$$= 1 - P(\text{iPhone or MAC})$$

$$= \boxed{.15}$$

$$P(\overline{\text{iPhone OR MAC}}) = P(\overline{\text{iPhone and MAC}})$$

$$= 1 - P(\text{iPhone and MAC})$$

$$= 1 - .25 = \boxed{.75}$$

Ex:

Given $P(A) = .7$, $P(B) = .3$, $P(A \text{ or } B) = .9$ 1) $P(A \text{ and } B)$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$.9 = .7 + .3 - P(A \text{ and } B)$$

$$.9 = 1 - P(A \text{ and } B)$$

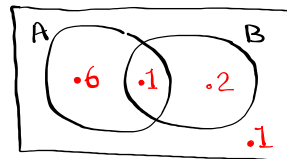
$$P(A \text{ and } B) = 1 - .9$$

$$P(A \text{ and } B) = .1$$

2) Construct Venn Diagram

$$.7 - .1 = .6$$

$$.3 - .1 = .2$$



Total = 1

$$3) P(\bar{A} \text{ and } \bar{B}) = P(\overline{A \text{ or } B}) = 1 - P(A \text{ or } B) = 1 - .9 = .1$$

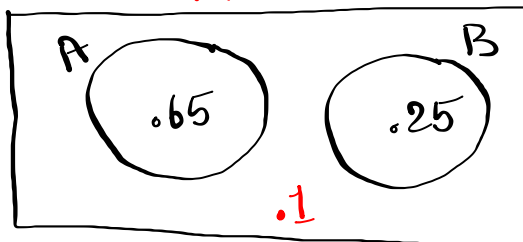
De Morgan's Law

$$4) P(\bar{A} \text{ or } \bar{B}) = P(\overline{A \text{ and } B}) = 1 - P(A \text{ and } B) = 1 - .1 = .9$$

Ex: $P(A) = .65$ $P(B) = .25$ A and B are disjoint events.

Mutually Exclusive Events

Total = 1



$$P(A \text{ and } B) = 0$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$= .65 + .25 - 0$$

$$= .9$$