

Lecture 17 conditional probability

- Example : SARS
- Sample space, basic outcome, and event
- Basic rule
- A and B (in both A and B) , A or B (in either A or B or both)
- Conditional probability of B given A
- $=P\{B|A\} = P\{A \text{ and } B\}/P\{A\}$
- Probability of death for China
- Given a SARS death case, what is the probability that the case is from China?

- Class enrollment : by year and by major
- Year : freshman, sophomore, junior, senior
- Major, life science, social science, math science,

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- Year : freshman, sophomore, junior, senior
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- A=freshman, B=life science
- A and B = life science freshman
- $P(A)=30\%$, $P(B)=35\%$, $P(A \text{ and } B)=25\%$
- Find $P(\text{non-life science freshman})$
- Randomly select a student. It turns out that he/she is not
- a freshman. What is the probability that he/she majors in
- life science?

Prisoner's dilemma

- Three prisoners , A, B, C are in jail. One of them is to be executed and the other two will be set free. Prisoner A asked the guard : one of my partners B or C will be set free. Could you please tell me which one of them will be set free?
- Guard thought a while and told A : If I do not tell you, then your chance of death is $1/3$. But if I tell you, then there are only two left and you are one of them to be killed. Your chance of death will be $1/2$. Do you really want to increase your chance of death ?

- Drawers A and B
- A has a good coin and a fake coin
- B has two good coins and a fake coin
- Open a drawer and pick a coin.
- Chance of getting fake one.
- Given the fake one is selected, what is the chance that it came from drawer A?