I2P Class notes and Homework

Week 1

*Course*: Introduction to Probability, Fall 2002.
*Instructor*: Chen-Hai Andy Tsao, A411 Science Building
Email: chtsao@mail.ndhu.edu.tw; Campus Phone: 866-2500 ext 21111.
URL: http://www.ndhu.edu.tw/∼chtsao/chtsao.html

O ce Hour: Thr: 1200{1300 @ A411 SEB or by appointment.
Honorary Code: No copied, cheated homework or cheating in exams.
bbs: `i2p @ bbs.ndhu.edu.tw.`
Course webpage: `http://www.am.ndhu.edu.tw/∼chtsao/edu/i2p/i2p.html`

# Class notes

A few questions to ask yourself:

- Why am I taking this course?
- What am I going to learn?
- What does it take to prevail or to succeed in this course?
- What are the relation among this course and other course?
- Am I well-equipped for this course? Or do I need to repolish some skills I've had but a little bit rusty?
- How does this course t to my career planning?

## Outline

- General Motif:
  - { e-world, digital world, n-world.
  - { Numericalized world: Determinism and Stochasticism
  - { Decisions and choices under uncertainty: what are they based upon? What do these info mean? How to utilize them?
- Why probabilty?
  Questions to be answered, the way to be answered, the way of formulating the problem.
  Motivating Examples.
  - { Should I bring along the umbrella with me?
  - { How many courses should I take this semester?
  - { The possible path of Typhoon Sinlaku, precipitation prediction

The rst two questions can be answered by $P(X = 1) = EX = 1$ and $ES_n$ respectively.

Remark 1 *Expectation, average in the long run, fair price of the lottery, prpric fair bet on the outcome(s)*

However, a "point guess" is seldomly be right. How close will the turn-out be the guess?

Theorem 1 (WLLN) *If $X_1; \cdots; X_n$ are iid random variables with $EX_1 =$ then $\forall$ $> 0$, $P( \mid Sn/n - \mid > ) \to 0; asn \to \infty$*

Remark 2 *If n is large, $S_n$=n is close to with high probability.*

Theorem 2 (SLLN) *If $X_1; \cdots; X_n$ are iid random variables with $EX_1 =$ then $S_n$=n $\to$ w/p/1.*

Remark 3 *Where will $S_n$=n go? Gambler's ruin. $S_n \to -\infty$ if* $< 0$.

What happens if we play only nite plays?

Theorem 3 (CLT) *If $X_1; \cdots; X_n$ are iid random variables with $EX_1 =$ and $^2 = E(X_i -$ $)^2$ then for any t $P(S_n - n$ $\frac{p}{\overline{n} \quad t)! \ \Phi(t)}$ where $(t) = {}^{R}{}_{y}{}_{infty}$ $t$ $(s)ds:$*

# Reading and Practice

- Think about some problems which are interesting to you and seemly probabilistic.
- Read Chapter 1 of Schervish and DeGroot.

# Homework for enjoyment

1 Use your favorite Chinese and English dictionaries to nd out the de nitions of probability. Write down 2 of them and give a brief example to each of them.
2. Employ your favoriteh engine(s) (say Yahoo, Yam, Google, etc) search the keyword "probability" both in English and Chinese. Find 3 websites which are most interesting to you and add them to your bookmarks. Write down the reasons why they are particularly interesting to you. You're also invited to share this info with others by posting in our class bbs board.
♠♡♢♣