Economics 310 Menzie D. Chinn
Spring 2004 Social Sciences 7418
University of Wisconsin-Madison

Problem Set 2

This problem set is due in lecture on **Wednesday, February 25th**. No late problem sets will be accepted. **Be sure to show your work** (that is, do not use a spreadsheet or statistical program to generate your answers), and to write your name, ID number, as well as the name of your Teaching Assistant, on your problem set.

Answer all these problems. Unless indicated by a "Z" prefix, the numbers indicate exercises from the textbook.

- 3.68
- 3.36
- 3.40
- 3.46
- 3.78
- Z.1: Bayes Rule:

a. An insurance company believes that people can be divided into two classes: those who are accident prone and those who are not. Their statistics show that an accident-prone person will have an accident at some time within a fixed 1-year period with probability 0.4, whereas this probability decreases to 0.2 for a non-accident-prone person. If we assume that 30% of the population is accident prone, what is the probability that a new policyholder will have an accident within a year of purchasing policy?

b. Suppose that a new policyholder has an accident within a year of purchasing policy. What is the probability that he or she is accident-prone?

- 4.18
- 4.68
- 4.82
- Z.2 Binomial random variables:

  a. Use the fomula for the binominal probability distribution to calculate the values of $p(x)$ for n=5, p=0.5.

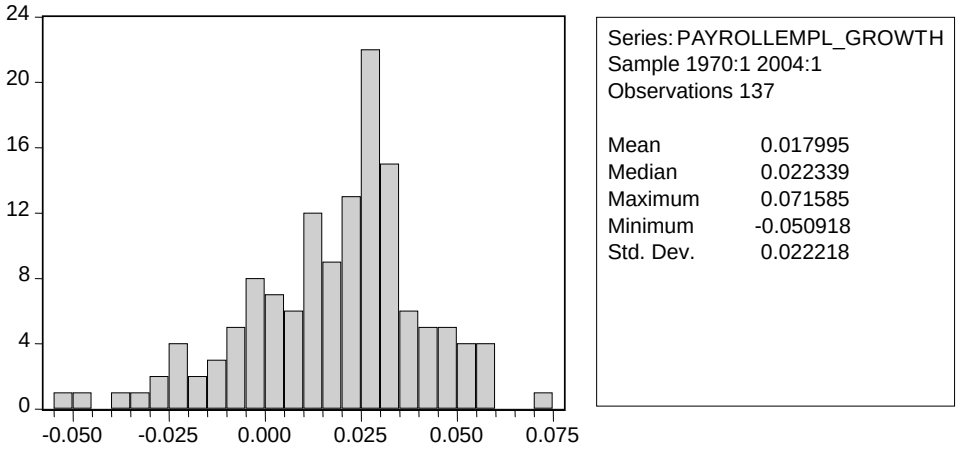
  b. Next find $\sum_{x=0}^{a} p(x)$ for a=0,1,2,3,4, using the values of $p(x)$ you calculated.

  c. Compare these sums with the values in the appropriate tables in Appendix B. **Indicate which table you select.**
- Z.3 Binomial random variables: Use the appropriate Table in Appendix B to find the following:

a. $P(x < 12)$ for $n = 20$, $p = 0.5$
b. $P(x \leq 6)$ for $n = 15$, $p = 0.6$
c. $P(x > 4)$ for $n = 10$, $p = 0.4$
d. $P(x \geq 6)$ for $n = 15$, $p = 0.6$
e. $P(3 < x < 7)$ for $n = 10$, $p = 0.5$

- 4.46
- 4.56
- 4.58

- 5.10
- 5.16
- 5.78
- 5.32
- Z.4: Consider the histogram for quarter-on-quarter growth rates of nonfarm payroll employment.



Source: Bureau of Labor Statistics, via St. Louis Fed (2/16/04).

Where PAYROLLEMPL_GROWTH is the ***annualized*** change in N viz., $[(N_t / N_{t-1})^4 - 1]$.

a. What is the probability that quarter-on-quarter growth in payroll employment will be greater than 3% on an annualized basis? (You can assume the distribution is normal).

b. The Administration is projecting a payroll employment growth rate of 3% ***over the entire year 2004***.[1] What is the probability that payroll employment will exceed 3% on an annualized basis for each of the next four quarters? (For purposes of this question, you may assume that growth rates in one quarter are independent of what occurs in the preceding quarter).

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[1] See *Economic Report of the* President, 2004 at http://www.gpoaccess.gov/eop/index.html and discussion at http://money.cnn.com/2004/02/10/news/economy/jobs_forecast/index.htm .