MATH 103 - Final Exam Study Guide - Fall 2007
1:00–3:00 p.m. on Monday, December 10th

Indicated page numbers refer to the appropriate section of the Course Notes.
Remember to bring a calculator with an exponential key (y^x or ^) and a square root key.

Unit 1 - Growth Models

- Explain the difference between *linear* and *exponential* growth and their long-term behaviors. (pp. 2, 13, 18–21)
- Explain what is meant by "rate of change" (or "slope") in a linear growth model. (pp. 3, 4 & 7)
- Write (and graph) an equation representing a population growing by either a *constant amount* each time period or a *constant percent* each time period. Use the equation to determine the size of the population at a given time. (pp. 3–6, 14, 17, 18 & 20)
- Explain the difference between *logistic* and *exponential* growth. (p. 22)

Unit 2 - Probability (Material on "counting" is omitted from exam.)

- Compute an empirical probability based on experimental data. (pp. 2 & 4)
- Use a given probability to compute the number of times a particular outcome is expected to occur. (top of p. 8)
- Compute expected value of a random process. (pp. 26–30)
- What is the meaning of *expected value*? Should it be used to make conclusions about the short term (say, the next five observations) or the long run (many, many observations)? (pp. 27 & 28)
- What does the *Law of Large Numbers* say? (p. 2) How does it relate to tossing a fair die many, many times? What does it say about tossing a fair coin? (p. 28)

Unit 3 - Working With Numerical Data

- Make histograms from given data and describe their shapes. (pp. 2–5)
- Compute the mean and median for a given set of data. How are they related to each other in a specific example? When is one more appropriate to use than the other? (pp. 6–11)
- Describe types of data that are well represented by a normal distribution. (pp. 13 & 14)
- Explain what the values μ and σ tell you about a normal distribution. (p. 15)
- Know and use the "68-95-99.7 Rule" to describe a normal distribution. (p.16)
- Compute the margin of error for a survey and construct and interpret a *confidence interval* for a population percentage. (pp. 23–25)
- Describe the relationship between the margin of error and both the sample size and confidence level. (pp. 25–27)

Unit 4 - Mathematics of Choice

- Analyze a set of possible alternatives (for example, investment options) using the five decision-making methods we discussed. (pp. 2–9)
- In a specific context, discuss which decision-making method might is appropriate. (p. 6)
- Describe the five voting methods and discuss their pros and cons. (pp. 10–13).
- Apply the five voting methods we discussed. (pp. 11–15)

The following formulas will be the <u>only</u> ones provided on the exam: $E.V. = \Sigma p_i x_i$ $m = z/2\sqrt{n}$
You should know the appropriate formula for the other calculations listed on this sheet (i.e., linear and exponential growth, mean, median, 68-95-99.7 Rule).

You should review the following terms. You will be required **to match about half of these terms to their definitions.**

a. linear growth
b. exponential growth
c. slope (or rate of change)
d. logistic growth
e. relative frequency
f. probability (i.e., theoretical)
g. empirical probability
h. "fair" experiment
i. odds
j. expected value
k. factorial
l. permutation
m. combination
n. "Basic Counting Law"
o. frequency
p. histogram
q. median
r. mean
s. standard deviation
t. normal curve
u. z-value
v. symmetric
w. skewed (right and left)
x. "68-95-99.7 Rule"
y. population
z. sampling frame
aa. sample
bb. sampling bias
cc. confidence interval
dd. margin of error
ee. confidence level
ff. compounding effect
gg. decision-making under certainty
hh. criterion of pessimism
ii. criterion of optimism
jj. criterion of equal probability
kk. criterion of expected value
ll. majority
mm. plurality
nn. Condorcet method
oo. Borda count
pp. approval voting
qq. undercoverage
rr. nonresponse
ss. response bias
tt. voluntary response
uu. leading question