Math 216 Midterm Exam 2 – Study Guide

The second midterm will cover Chapters 3 and 4 in your textbook, specifically these sections and subsections: 3.1, 3.2, 3.4, 3.5.2, 4.1, 4.2, 4.3, and 4.4. You are encouraged to bring a calculator (scientific or graphing) to the test, but you will not be allowed to use a laptop during the test. You may bring one 3”x5” index card with notes (front and back) for use during the test.

You should be able to do each of the tasks listed below and understand the concepts associated with each task. See the end of this document for a list of suggested practice problems from the textbook.

Section 3.1 – Normal Distributions

• To analyze the graph of a normal distribution, particularly how means, standard deviations, and z-scores are represented
• To compute probabilities for a random variable with a standard or non-standard normal distribution using a normal probability table

Section 3.2 – Probability Plots

• To construct and interpret a standard normal probability plot for a small data set
• To interpret a standard normal probability plot for a large data set

Section 3.4 – Binomial Distributions

• To determine whether a given experiment is a binomial experiment
• To model a given scenario using an appropriate binomial random variable
• To compute probabilities using binomial probability distributions
• To compute the expected value, variance, and standard deviation of a binomial random variable

Section 3.5.2 – Poisson Distributions

• To model a given scenario using an appropriate Poisson random variable
• To compute probabilities using Poisson probability distributions
• To compute the expected value, variance, and standard deviation of a Poisson random variable

Section 4.1 & 4.4 – The Central Limit Theorem

• To discuss the conditions under which the Central Limit Theorem applies
• To determine the approximate distribution of a sample mean (including its mean and standard deviation) given the mean and standard deviation of the underlying distribution, assuming that the Central Limit Theorem applies
• To compute probabilities for a sample mean given the mean and standard deviation of the underlying distribution, assuming the Central Limit Theorem applies and using a normal probability table

Section 4.2 – Confidence Intervals
• To describe (accurately!) the meaning of an X% confidence interval
• To discuss conditions under which an X% confidence interval can be constructed from a sample mean
• To construct the X% confidence interval for the mean of a population given a sample mean and either the sample or population standard deviation
• To determine the sample size necessary to construct a X% confidence interval of a specified width for the mean of a population given the population standard deviation
• To discuss the factors that determine the width of a confidence interval (e.g. confidence level, sample size, and population or sample standard deviation)

Section 4.3 – Hypothesis Tests

• To determine appropriate null and alternative hypotheses for a given hypothesis test
• To describe the Type I and II errors associated with a given hypothesis test and to evaluate the relative seriousness of these errors
• In the context of a one-sided or two-sided hypothesis test for a population mean when the population standard deviation is known or the sample size is large enough to permit use of the sample standard deviation...
  o To determine whether to reject or accept the null hypothesis at a specified significance level by using an appropriate confidence interval
  o To compute the p-value for a specified hypothesis test and set of data
  o To determine whether to reject or accept the null hypothesis at a specified significance level using the p-value for a set of data
  o To discuss the relationships among the population or sample standard deviation, the sample size, the p-value for a set of data, and the difference between the actual and assumed population means.

End-of-Chapter Exercises

• Section 3.1 – 3.1, 3.3, 3.5, 3.7, 3.9, 3.11, 3.13
• Section 3.2 – 3.19
• Section 3.4 – 3.27, 3.29, 3.31, 3.33
• Section 3.5 – 3.43, 3.45
• Section 4.1 – 4.3, 4.5, 4.7
• Section 4.2 – 4.11, 4.13, 4.15, 4.17, 4.19, 4.21
• Section 4.3 – 4.23, 4.27, 4.29, 4.31, 4.35
• Section 4.4 – 4.37