Math 370 Spring 97

Quiz **3** Ron Buckmire

Name: ____________________

Numerical Analysis
Friday April 11, 1997
Ron Buckmire

Date: ____________________
Time Begun: ____________________
Time Ended: ____________________

Topic covered: Gaussian Quadrature / Improper Integrals

Instructions:

1. Once you open the quiz, you have 60 minutes to complete it.
2. You may use the book or any of your class notes. You must work alone.
3. If you use your own paper, please staple it to the quiz before coming to class. If you don't have a stapler, buy one.
4. After completing the quiz, sign the pledge below stating on your honor that you have adhered to these rules.
5. Your solutions must have enough details such that an impartial observer can read your work and determine HOW you came up with your solution.
6. Relax and enjoy...
7. **This quiz is due on Monday, April 14**, in class. NO LATE QUIZZES WILL BE ACCEPTED.

Pledge: I, ____________________, pledge my honor as a human being and Occidental student, that I have followed all the rules above to the letter and in spirit.

SHOW ALL YOUR WORK

This problem is about using **Gaussian Quadrature** to evaluate integrals on domains other than [-1,1].

1. Evaluate $\int_{-1}^{1} \frac{1}{x^2+4}\,dx$ using $N = 2$ Gaussian Quadrature

2. Use the transformation $t = 1/x$ to transform the improper integral $\int_{1}^{\infty} \frac{1}{x^2+4}\,dx$

3. Use $N = 2$ Gaussian Quadrature to evaluate the transformed integral from **(2)**, $\int_{0}^{1} \frac{1}{1+4t^2}\,dt$

4. Compute the exact value of $\int_{-1}^{1} \frac{1}{x^2+4}\,dx$ and use this to find the actual error in your estimates in problem **(1)**. Compare the actual error to the theoretical error bound for the $N = 2$ Gaussian Quadrature Rule. (You may want to use `Derive` to get $f^{(4)}(c)$.)