Report on Test 2 Prof. Ron Buckmire

Point Distribution (N=18)

Range	100+	93+	90+	87+	83+	80+	77+	73+	70+	68+	63+	60+	60-
Grade	A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
Frequency	4	2	2	0	0	0	0	4	0	1	1	1	3

Summary Overall class performance was very encouraging! The mean score was 70. The median score was 75. The standard deviation was 19. The high score was 108 (thelow score was 51). I think this is the kind of exam students enjoy more than Professors, but I thought the exam clearly tested the central ideas and learning outcomes of this section of the course: learning familiarity with MATLAB as a tool to solve specific problems, the interpolation problem, the best fit curve prroblem and ability to express mathematical ideas clearly in written form.

#1 Polynomial Interpolation. The central idea of polynomial interpolation is that there exists a unique polynomial of degree n given $n+1$ data points that will exactly match the given data. That means that questions (a), (b) and (c) are just three different ways of obtaining the same quadratic polynomial.

#2 Approximation Theory. (a) For 15 points, you need to explain not only what each line of the MATLAB code does, but in the broader context of the overall intent of the script. This is your chance to illustrate your understanding of how to use MATLAB.

#3 These are TRUE or FALSE questions. **(a)** "An interpolated value is always more accurate than an extrapolated value." **FALSE.** Think about the bounds on the error of a an interpolated value versus an extrapolated value. However the question gives no information on where the extrapolated value is located. MUST the extrapolated error be worse than the interpolated value for ALL values? **TRUE.** "For a diagonal matrix A of real positive numbers, the matrix 1-norm equals the matrix infinity-norm, i.e. $||A||_1 = ||A||_\infty$" This problem is easily answerable from the definition of the matrix norms, and is very helpful with answering the BONIS question! **(c)** "Given experimental data representing a presumed nonlinear relationship between the dependent variable y and the independent variable x, in order to find the curve of best fit (that minimizes the least square error) one must solve a nonlinear system of equations." **FALSE.** Is there really only way to solve the "best fit curve" problem?