DATE of FINAL EXAM: Monday, November 17th 2003 from 8:00 am to 12:00 noon.

FORMAT of FINAL EXAM: There will be two parts. During the first part, you will not be allowed to use anything except a writing utensil. During the second part, you will be allowed to use your laptop starting with off a blank Maple worksheet, and calculator. No network cables may be used during the exam, and no cheat sheets will be allowed during any part of the exam.

On the first part of the exam, your basic skills and basic knowledge of the material in the course is tested. On the second part of the exam, your basic skills, basic knowledge and problem solving abilities are tested. Part II consists mainly of word problems.

The remainder of this sheet consists of a list of questions to help you start studying for the final exam. Your ability to answer these questions should focus on what areas you need to concentrate when studying.

- What is the order of a differential equation?
- What is the difference between linear differential equation and nonlinear differential equations?
- What is a separable first order differential equation?
- What is an initial value problem?
- How do you solve a first order linear differential equation?
- How do you solve a first order separable differential equation?
- What is the difference between a general solution to a differential equation and a particular solution to a differential equation?
- What is the difference between a linear system of equations and a nonlinear system of equations?
- What is the difference between a leading variable and a free variable?
- What is the difference between a consistent system of linear equations and an inconsistent system of linear equations?
- Does every system of linear equations have a solution?
- Is the solution of a system of linear equations unique?
- How do you solve a system of linear equations?
- How do write a system of linear equations as a matrix equation?
- Does every matrix have an inverse matrix?
- How do you solve a matrix equation using an inverse?
• What is the method of least squares? When should you use it to solve a system of linear equations?
• What is a complex number?
• How do you add, subtract, multiply, divide complex numbers?
• How do you write a complex number in polar form?
• What is Euler’s formula? How do you evaluate \( e^{a+bi} \)?
• What is the difference between a second order homogeneous differential equation and a second order nonhomogeneous differential equation?
• How do you solve a second order constant coefficient homogeneous differential equation?
• How do you solve a second order constant coefficient nonhomogeneous differential equation?
• How do you solve an initial value problem for a second order constant coefficient differential equation?
• What is the difference between undamped, underdamped, critically damped, and overdamped mechanical vibrations?
• What is the natural frequency and resonant frequency of an undamped mass-spring system?
• How do you define the resonant frequency for a damped mass-spring system?
• What is the transient part of the solution for a forced mass-spring-dashpot system?
• What is the steady-state part of the solution for a forced mass-spring-dashport system?
• What is an eigenvalue and eigenvector for a matrix?
• How do you find the eigenvalues and the eigenvectors of a matrix?