Part I: Hand Calculations: NO CALCULATORS 60 %

- Be able to solve systems of equations.
- Be able to do basic matrix and vector operations.
- Be able to find inverses and determinants.
- Be able to do LU factorization.
- Be able to convert word problems into matrix problems.
- Be able to solve 3D geometry problems with lines and planes.

Part II: Theory: NO CALCULATORS 20 %

Here are some potential theory problems. Any short theory exercise done for homework is fair game.

- What is the formal definition of matrix multiplication?
- Let r be a real number. Let A be an $m \times n$ matrix and let O be the $m \times n$ of all zeros. Prove $rA = O$ implies that either $r = 0$ or $A = O$. Give reasons for all steps.
- Be able to prove any part of Theorem 1.3 (page 41; exercise T12)
- Prove that $(A^T)^{-1} = (A^{-1})^T$, assuming of course that A is invertible. Give reasons for all steps.
- Prove that $\det A = 0$ if and only if A is not invertible.

Part III: Use Maple 20%

Same material as Part I. But, also know how do to basic algebra and how to plot simple graphs with Maple. Make sure you type your name on your work before printing!

Do not be surprised if you have to think.