MATH 2418

Exam 2 Reviews

3.3

Complete solution Ax = b

**Book**

Chapter main points

1. The complete solution Ax = b: x = (one particular xp) + (any xn in the nullspace)
2. Elimination on [A b] leads to [R d]. Then Ax = b is equivalent to Rx = d.
3. Ax = b and Rx = d are only solvable when all zero rows of R have zeros in d.
4. Full column rank r = n when the nullspace N(A) = zero vector, no free variables
5. Full row rank r = m, when it’s column space C(A) is Rm: Ax = b is always solvable,
6. Four cases:
   1. r = m = n
      1. A is invertible
   2. r = m < n
      1. every Ax = b is solvable
   3. r = n < m
      1. Ax = b has 1 or 0 solutions
   4. r < m, r < n
      1. Ax = b has 0 if infinitely many solutions

Facts

Rules

**Class**

**Recitation**