

## Reading Assignment 10

### Read Sect. 3.4

1. What did you learn in Section 3.3 according to the first paragraph in Section 3.4?
2. What is the objective of Section 3.4?
3. What does it mean for two systems to be equivalent? Give an example of two equivalent systems.
4. According to Theorem 3.13, how can we obtain an equivalent system given  $Ax = b$ ? Give an example to illustrate the theorem.
5. Is it true that when we solve a linear system we use both row and column elementary operations? Explain your answer.
6. List the steps used in the example in page 183 to solve the linear system.
7. What three conditions must a matrix satisfy to be in reduced row echelon form?
8. Give an example for each of the three conditions in the definition of reduced row echelon form of a matrix that fails each condition. Explain why it fails the condition.
9. Give an example of a matrix that is in reduced row echelon form.
10. Is it possible for a matrix  $A$  to have two reduced row echelon matrices? Why or why not? (see page 186).
11. What is Gaussian elimination?
12. What is the objective of using Gaussian elimination on a matrix? (paragraph 2 in page 187).
13. What is the general solution of a linear system  $Ax = b$ ? Tell me what the symbols mean in your answer.

14. Why are there  $n - r$   $u_i$  vectors in the equation of the general solution of  $Ax = b$ ? In which subspace are the  $u_i$ 's contained? Please be very explicit.
15. What does Theorem 3.16 say about the rank of a matrix  $A$ ?
16. How do we obtain a set of linearly independent columns in the matrix  $A$ ? (Theorem 3.16(b,c)).

**Practice Problems:** Section 3.4 # 1, 2, 4, 5, 8, 9, 10, 12