Section 2.2, Problem 3. In part (d), the determinant is equal to 2.

Section 2.2, Problem 12. Hint: Use the fact that det(AB) = det(A) det(B).

Section 2.2, Problem 13. If AB = I, then det(AB) = det(A) det(B) = 1. In particular, det(A) ≠ 0, so A is nonsingular, so A⁻¹ exists. Then, we have A⁻¹(AB) = A⁻¹I = A⁻¹, and also, A⁻¹(AB) = (A⁻¹A)B = IB = B. Hence, B = A⁻¹ and therefore BA = I.

The significance is that to check whether B = A⁻¹, it suffices to check that either AB = I or BA = I (instead of having to check both these.

Section 3.1, Problem 13. This is not a vector space. The following axioms fail: A3, A4, A5, A6. (To answer the problem, you only need to give one example of an axiom that fails, but you should show explicitly how it fails.)

Section 3.2, Problem 11. y in is Span(x₁, x₂), but x is not.