Problem Set III - Due: Tuesday 11:00 p.m., February 8.

Do each of the following problems.

1. Show the map $T$ defined on page 15 in the proof of Theorem 1 is well defined and carry out the details on the claim that $T$ is an isomorphism.

2. Let $V$ be a finite dimensional vector space over $K$ and $V'$ be its dual space.
   (a): Show the fact that we used in the class: Let $x \in V$ be a fixed vector. If $l(x) = 0$ for all $l \in V'$ then $x = 0$.
   (b): On the other hand, let $l \in V'$ be a fixed covector, show that if $x(l) = 0$ for all $x \in V$ then $l = 0$.

3. Verify Lax’s statement just below equation (8) on Page 11 that $L$ as defined in equation (8) is well defined.

4. Exercise 1, Chapter 2, Page 11 of Lax.

5. Exercise 2, Chapter 2, Page 12 of Lax.

6. Exercise 1, Chapter 3, Page 15 of Lax.

7. Exercise 4, Chapter 3, Page 20 of Lax.

8. Exercise 1, Chapter 4, Page 26 of Lax.