Math 42
Differential Geometry
Winter 2002
Assignment 5
Due Monday, February 25, 2002

1. Let $L : V \to V$ be a self-adjoint map on the inner product space $(V, <, >)$ and let $\mathcal{Q}(v) =< v, L(v) >$ be the corresponding homogeneous quadratic form. Show that for any $v, w, \in V$ we have

$$< L(v), w >= \frac{1}{2}(\mathcal{Q}(v + w) - \mathcal{Q}(v) - \mathcal{Q}(w)).$$

   This exercise is useful for us in that it shows that the shape operator can be constructed from the second fundamental form. Do you see how to do this?

2. **Chapter 14:** 1, 2, 8, & 18

3. **Chapter 15:** 7, 9 & 11