An unbounded symmetric operator on an inner product space.

****

Suppose that H is the subspace of l^2 consisting of all sequences (ζ_n) with $\zeta_n = 0$ for all sufficiently larg n. H is not complete (Since (a_n) where $a_n = (1, \frac{1}{2}, \cdots, \frac{1}{n}, 0, 0, \cdots)_{n \in \mathcal{N}}$ is a Cauchy divergent sequence in H).

Let T denote the linear mapping $(\zeta_n) \mapsto (n\zeta_n)$ on H. T is symmetric, for $< T((\zeta_n)), (\eta_n) >= \sum_{n=1}^{\infty} n\zeta_n\overline{\eta_n} =< (\zeta_n), T((\eta_n)) >$. T is unbounded since if (ξ_n) is the orthonormal basis for l^2, for each $n, \xi_n \in H, \| \xi_n \|= 1$ and $\| T\xi_n \|= n$.