cofinite and cocountable topologies

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The *cofinite topology* on a set X is defined to be the topology $\mathcal{T}$ where

$$\mathcal{T} = \{A \subseteq X \mid X \setminus A \text{ is finite, or } A = \varnothing\}.$$

In other words, the closed sets in the cofinite topology are X and the finite subsets of X.

Analogously, the *cocountable topology* on X is defined to be the topology in which the closed sets are X and the countable subsets of X.

The cofinite topology on X is the coarsest `http://planetmath.org/T1Space`T_1 topology on X.

The cofinite topology on a finite set X is the discrete topology. Similarly, the cocountable topology on a countable set X is the discrete topology.

A set X together with the cofinite topology forms a compact topological space.