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[Continued from Page 356.]

Proof. Since Σ is a non-discrete topology on X there exists $c \in X$ with $\{c\} \notin \Sigma$. Let Δ be the topology on X generated by

$$\Sigma \cup \{\{x\} \mid x \in X \backslash \{c\}\}$$

and notice Δ is non-discrete since $\{c\} \notin \Delta$.

Consider

$$S = \cap \{A \in \Delta \mid c \in A\}.$$

Since Δ is finite if $S = \{c\}$ then $\{c\} \in \Delta$. Thus, choose $b \in S \backslash \{c\}$. Let

$$\Gamma = \{B \subset X \mid b \in B \text{ or } c \notin B\}.$$

Let $T \in \Delta$. If $c \in T$ then $S \subset T$ and so $b \in T$ which implies $T \in \Gamma$. If $c \notin T$ then $T \in \Gamma$ by definition of Γ. Hence

$$\Sigma \subset \Delta \subset \Gamma.$$

Corollary. Every non-discrete topology on a finite set with n elements is contained in a non-discrete topology with $3(2^{n-2})$ elements.

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