

### HOMEWORK WEEK OF OCT. 13

1. Suppose that a topological space  $X$  has two topologies,  $\mathcal{T}$  and  $\mathcal{F}$  with  $\mathcal{T} \subset \mathcal{F}$ . If, in addition,  $\mathcal{T}$  is Hausdorff and  $\mathcal{F}$  is compact, show that  $\mathcal{T} = \mathcal{F}$ .
2. If  $X$  is a Hausdorff space, then the diagonal  $\{(x, x) : x \in X\}$  is closed in  $X \times X$ .
3. page 152 #21, 22, 23, 24.