

You are expected to do the following problems to a high standard (i.e., at least well enough to be published in a textbook) for full credit. Four of these problems will be selected (by Jon) for grading, with each worth 5 points.

1. [Baker 2.3.13] Let  $U$  be a closed set and let  $V$  be an open set in a topological space. Show that  $U - V$  is closed and  $V - U$  is open.

2. [Baker 2.3.14] Let  $A$  and  $B$  be subsets of a topological space  $(X, \mathcal{T})$ . Show that

$$(X - \text{Cl}(A)) \cup (X - \text{Cl}(B)) \subseteq X - \text{Cl}(A \cap B).$$

3. [Baker 2.3.14] Let  $A$  and  $B$  be subsets of a topological space  $(X, \mathcal{T})$ . Show that

$$(X - \text{Cl}(A)) \cup (X - \text{Cl}(B)) \neq X - \text{Cl}(A \cap B).$$

4. [Baker 2.3.15] Let  $A$  and  $B$  be subsets of a topological space  $(X, \mathcal{T})$ . Show that

$$X - \text{Cl}(A \cup B) = (X - \text{Cl}(A)) \cap (X - \text{Cl}(B)).$$