Question 10

Part a

$A - \emptyset = A$

$= A \cap \overline{\emptyset}$

The complement of the empty set is the universal set, so $\overline{\emptyset} = U$

By Question 6, Part b, $A \cap U = A$

$= A \cap U = A$

$\therefore A - \emptyset = A$

Part b

$\emptyset - A = \emptyset$

By definition,

$= \emptyset \cap \overline{A}$

By definition,

$= \{x \,|\, x \in \emptyset \wedge x \in \overline{A}\}$

Because $x \in \emptyset \equiv \mathbf{F}$

$= \{x \,|\, \mathbf{F} \wedge x \in \overline{A}\}$

By the Domination Laws of Propositional Logic, $p \wedge \mathbf{F} = \mathbf{F}$

$= \{x \,|\mathbf{F}\}$

$\therefore \emptyset - A = \emptyset$