Problem 3.15. Show that the collection of decidable languages is closed under the operation of.

Part b. concatenation.

Proof. $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\quad$ $\square$

Part c. star.

Proof. $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\quad$ $\square$

Part d. complementation.

For any decidable language L, let M be the **TM** that decides it. Construct a **TM** M' that decides the complement of L:

"On input w:

1. Run M on w. If it accepts, *reject*. Otherwise, *accept*."

Part e. intersection.

For any two decidable languages L_1 and L_2, let M_1 and M_2 be the **TM**s that decide them. We construct a **TM** M' that decides the intersection of L_1 and L_2:

"On input w:

1. Run M_1 on w. If it rejects, *reject*.

2. Run M_2 on w. If it accepts, *accept*. Otherwise, *reject*."