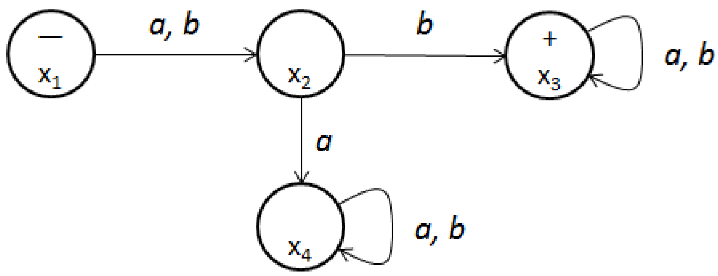
Theorem 12

If L_1 and L_2 are regular languages, then $L_1 \cap L_2$ is also a regular language.

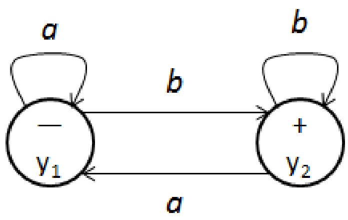
In other words, the set of regular languages is closed under intersection.

Exercise 6, page 185

L_1 $(\mathbf{a}+\mathbf{b})\mathbf{b}(\mathbf{a}+\mathbf{b})^*$



L_2 $(\mathbf{a}+\mathbf{b})^*\mathbf{b}$



L_1	*a*	*b*
$-x_1$	x_2	x_2
x_2	x_4	x_3+
$+x_3$	x_3+	x_3+
x_4	x_4	x_4

L_2	*a*	*b*
$-y_1$	y_1	y_2+
$+y_2$	y_1	y_2+

$L_1 \cap L_2$	*a*	*b*
$-Z_1 = x_1$ or y_1	x_2 or $y_1 = Z_2$	x_2 or $y_2^+ = Z_3$
$Z_2 = x_2$ or y_1	x_4 or $y_1 = Z_4$	x_3^+ or $y_2^+ = Z_5^+$
$Z_3 = x_2$ or y_2	x_4 or $y_1 = Z_4$	x_3^+ or $y_2^+ = Z_5^+$
$Z_4 = x_4$ or y_1	x_4 or $y_1 = Z_4$	x_4 or $y_2^+ = Z_6$
$^+Z_5 = x_3$ or y_2	x_3^+ or $y_1 = Z_7$	x_3^+ or $y_2^+ = Z_5^+$
$Z_6 = x_4$ or y_2	x_4 or $y_1 = Z_4$	x_4 or $y_2^+ = Z_6$
$Z_7 = x_3$ or y_1	x_3^+ or $y_1 = Z_7$	x_3^+ or $y_2^+ = Z_5^+$