

$$\begin{aligned}
r_{2,3}^2 &= r_{2,2}^1 (r_{2,2}^1)^* r_{2,3}^1 + r_{2,3}^1 \\
&= (\epsilon + 00)(\epsilon + 00)^*(1 + 01) + (1 + 01) \\
&= (00)^*(1 + 01) \\
&= (00)^*1 + (00)^*01 \\
&= 0^*1
\end{aligned}$$