

$$\begin{aligned}
 q &= (1 - \beta(q) - \gamma(q))p_1 + \beta(q)p_2 + \gamma(q)p_3 \\
 &= p_1 + \beta(q)(p_2 - p_1) + \gamma(q)(p_3 - p_1)
 \end{aligned}$$