$$a_1 = a_2 = 0$$

Given
_____

$$u_j = w_j - \frac{1}{4} r_j (L_j)$$ Two cities: $L_1 + L_2 = 100$

$$W_1 = 10, \quad W_2 = 8 \qquad r_j (L_j) = \frac{8 L_j}{}$$

Solve for Eq pop levels, L_1^* and L_2^*
_____

① use locational Eq

$$u_1 = u_2$$

$$w_1 - \frac{1}{4} (8 L_1^*) = w_2 - \frac{1}{4} (8 L_2^*)$$

$$10 - 2 L_1^* = 8 - 2 L_2^*$$

$$2 - 2 L_1^* = -2 L_2^*$$

$$L_2^* = L_1^* - 1 \quad \textcolor{red}{*}$$

② use the total population constraint:

$$L_1^* + L_2^* = 100$$

$$L_1^* + L_1^* - 1 = 100$$

$$2 L_1^* = 101$$

$$L_1^* = 50.5$$

_____

\textcolor{red}{Plug into \quad *} \quad $L_2^* = 49.5$