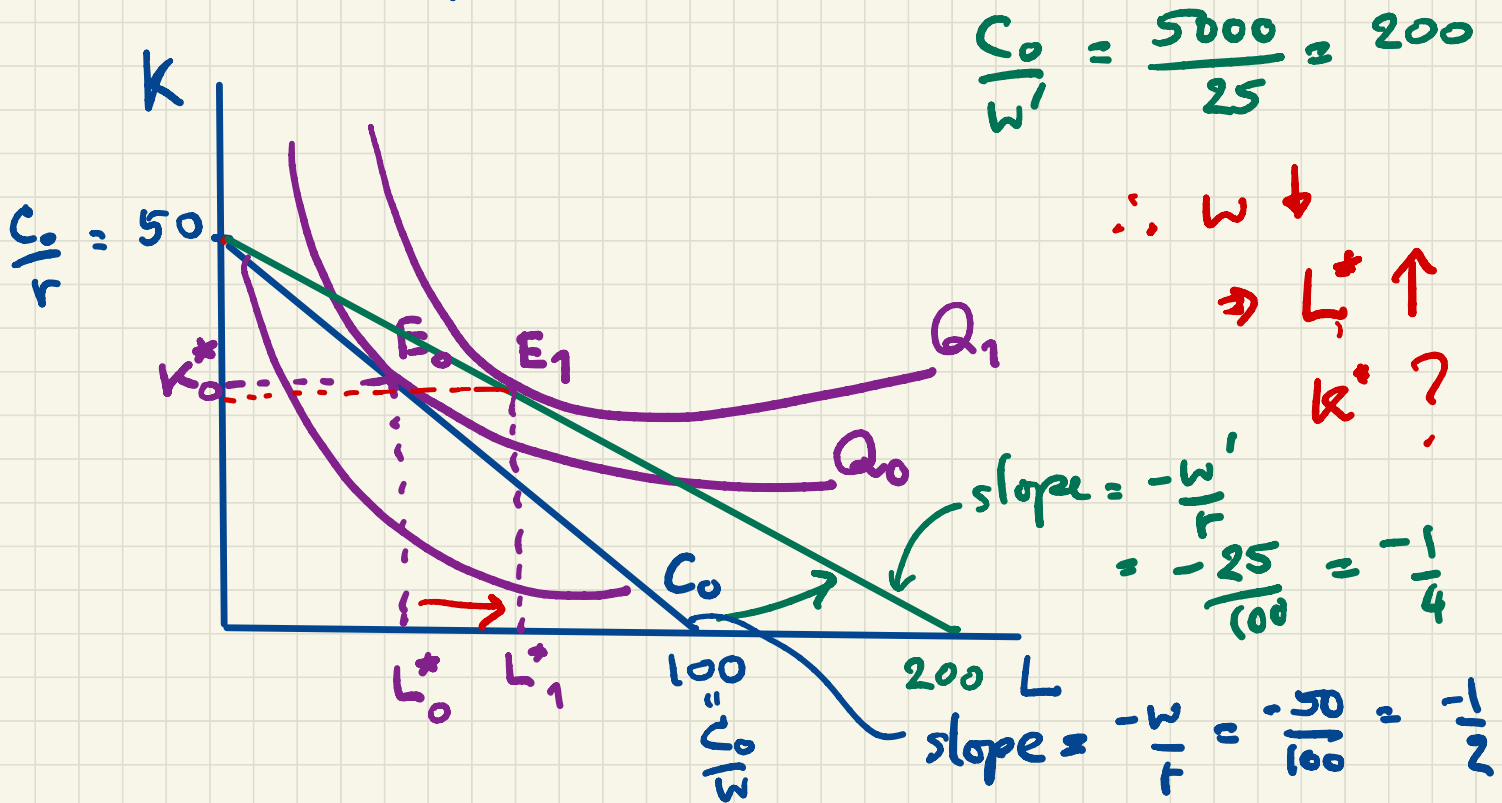


Excercise Given $C_0 = 5000$, $w = 50$, $r = 100$.
 If w decreases to 25, illustrate the change
 in the optimal input combinations (L^*, k^*) .



Production Equilibrium: Cost Minimization

- Firm's objective:

$$\min_{L,K} C = wL + rK \quad \text{subject to } f(L, K) = Q_0$$

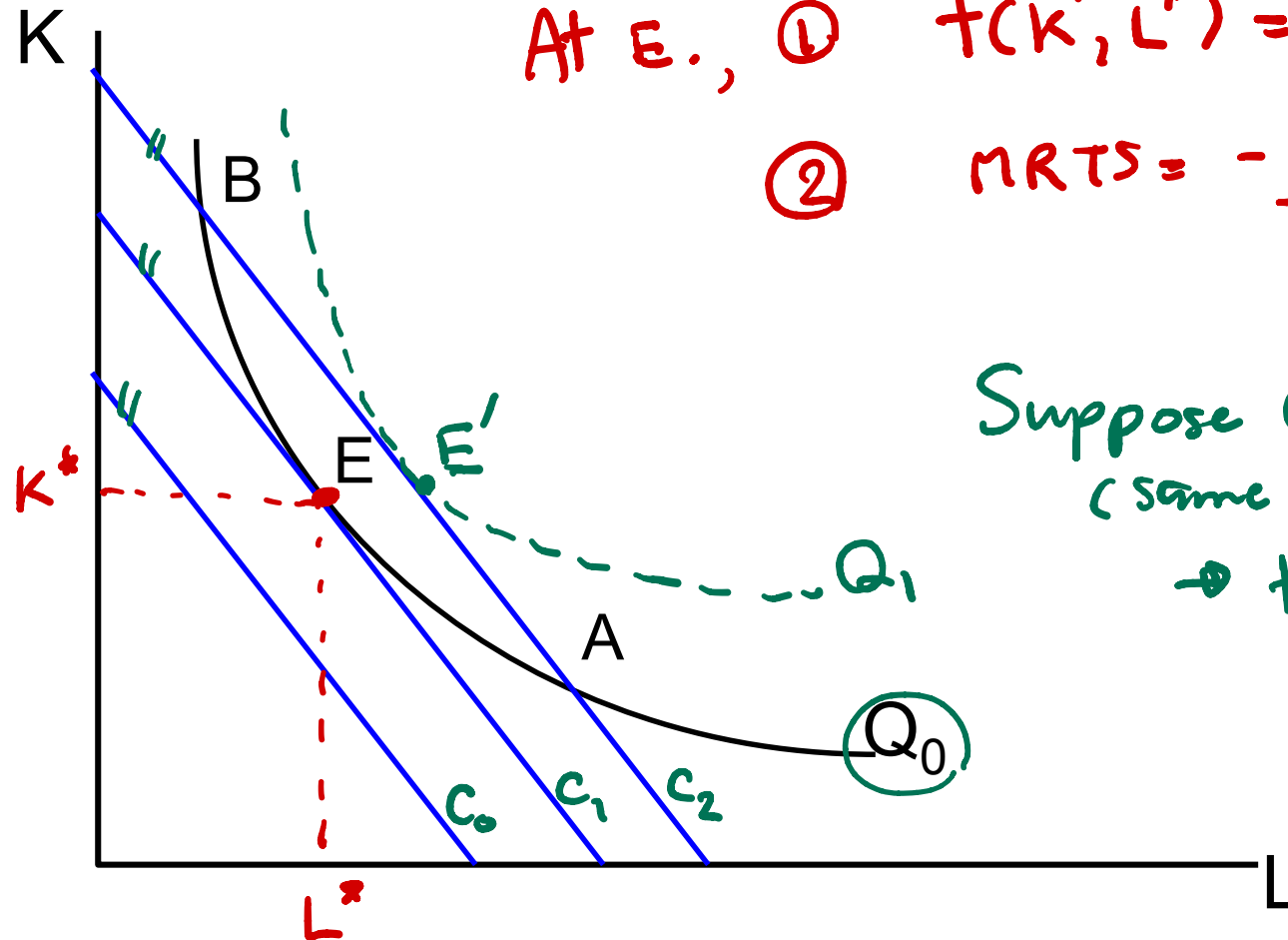
- Equilibrium conditions

$E = (L^*, K^*)$ is the equilibrium when:

- $f(L^*, K^*) = Q_0$ *cie. L^*, K^* produce fixed output Q_0*
- $\frac{MP_L}{MP_K} = \frac{w}{r}$ $\Rightarrow \frac{MP_L}{w} = \frac{MP_K}{r}$
MRTS (slope of isoquant) = price ratio (slope of isocost)

Graph: Cost Minimization

w & r are fixed



At E ., ① $f(K^*, L^*) = Q_0$

② $MRTS = -\frac{MP_L(K^*, L^*)}{MP_K(K^*, L^*)} = -\frac{w}{r}$

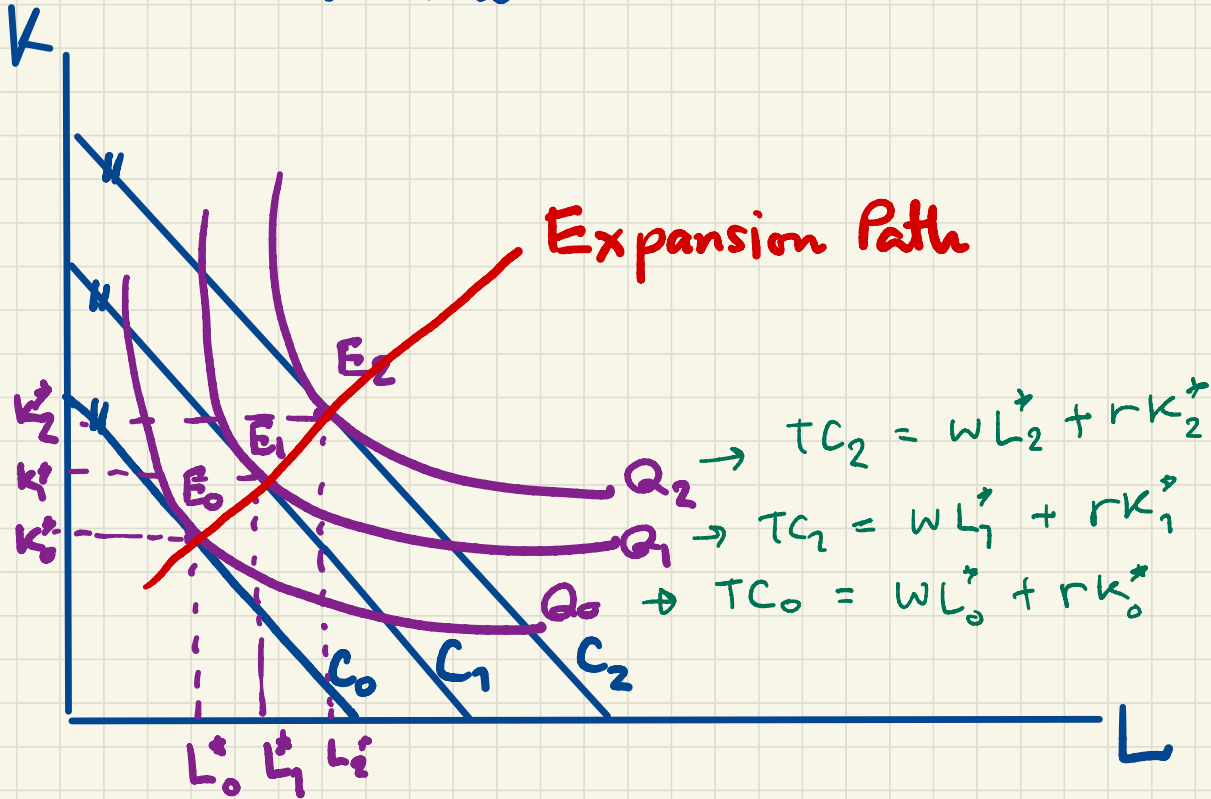
Suppose Q_0 increases to Q_1
(same technology)

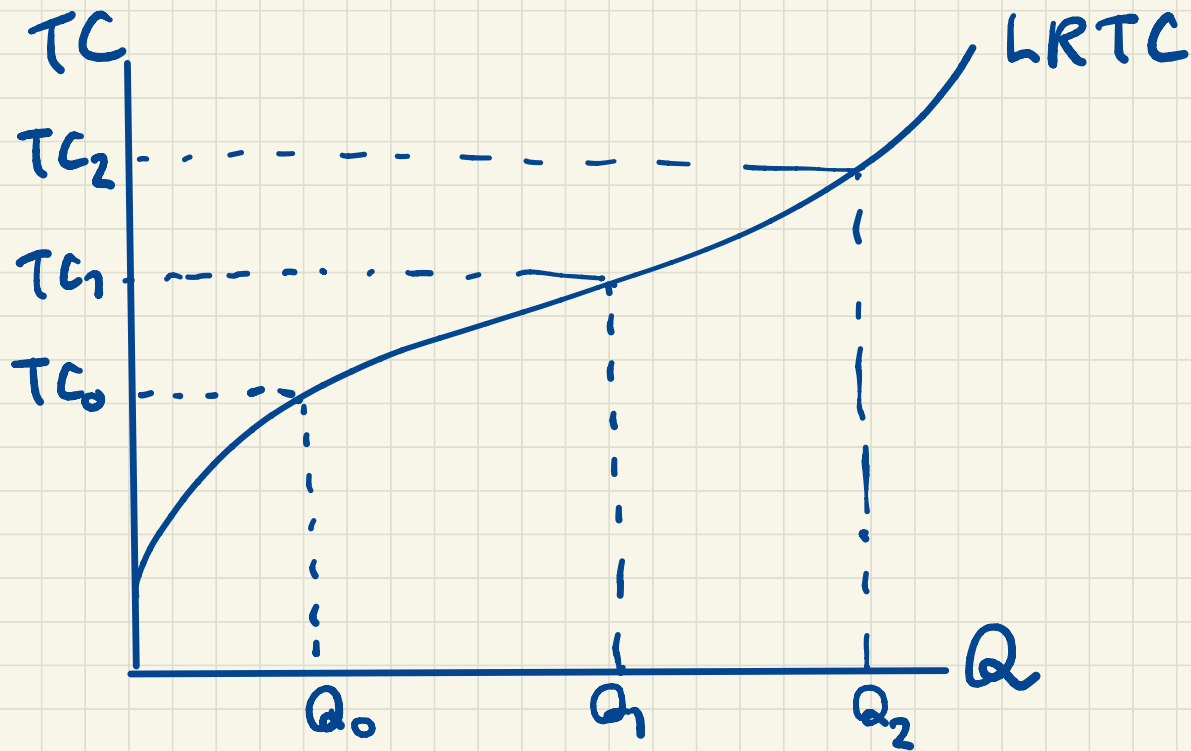
→ total cost ↑
 $K^*, L^* \uparrow$

Least-Cost Combinations & Expansion Path

- **Expansion path** is a line that connects all the tangent points between the isocost lines and isoquants, for given w and r .
 - It indicates the optimal L and K that minimizes the total cost for each given quantity level.
(i.e. It includes all least-cost combinations of inputs).
 - It indicates the optimal L and K that maximizes the output Q for each given cost level.

w and r are fixed



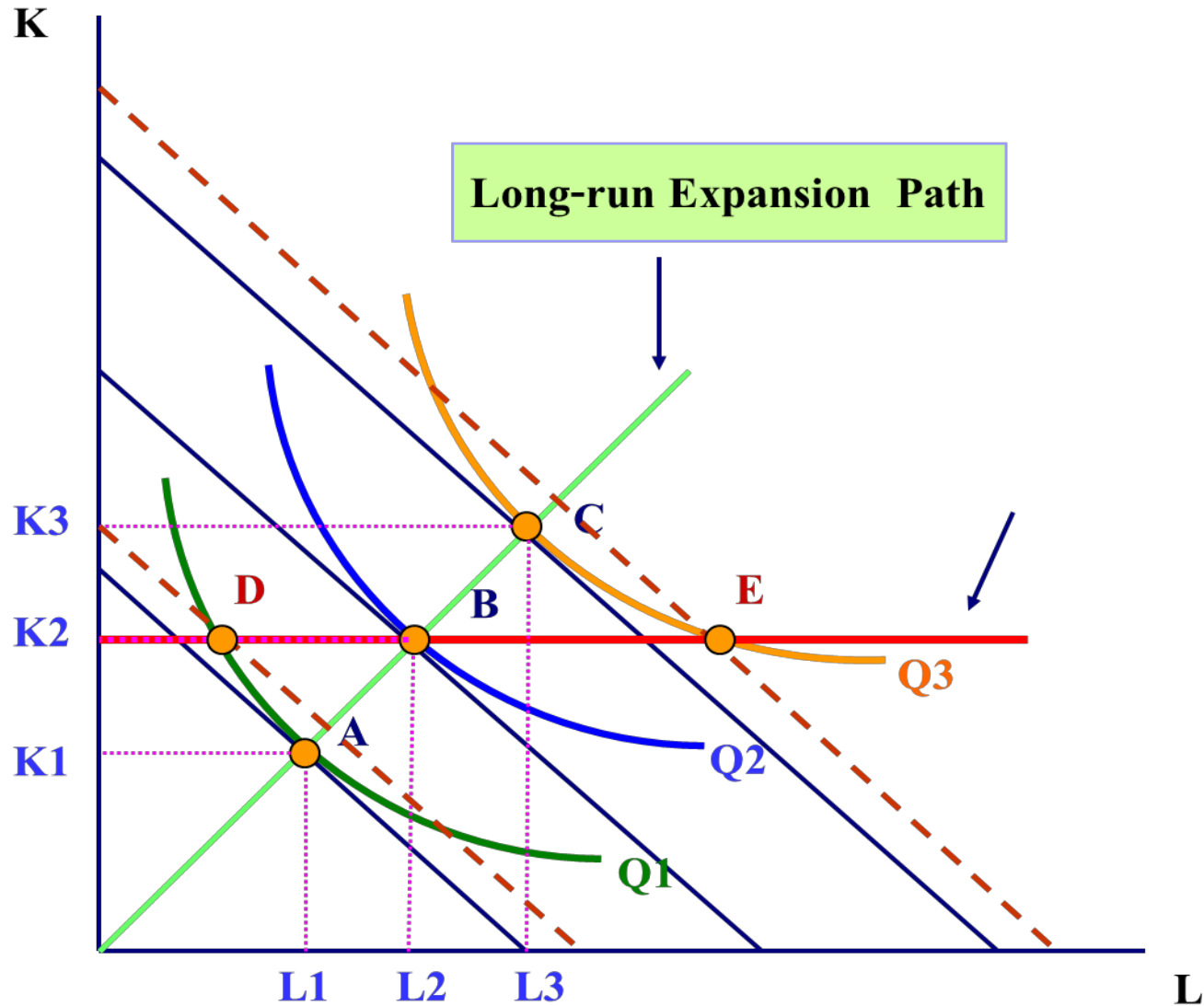


where

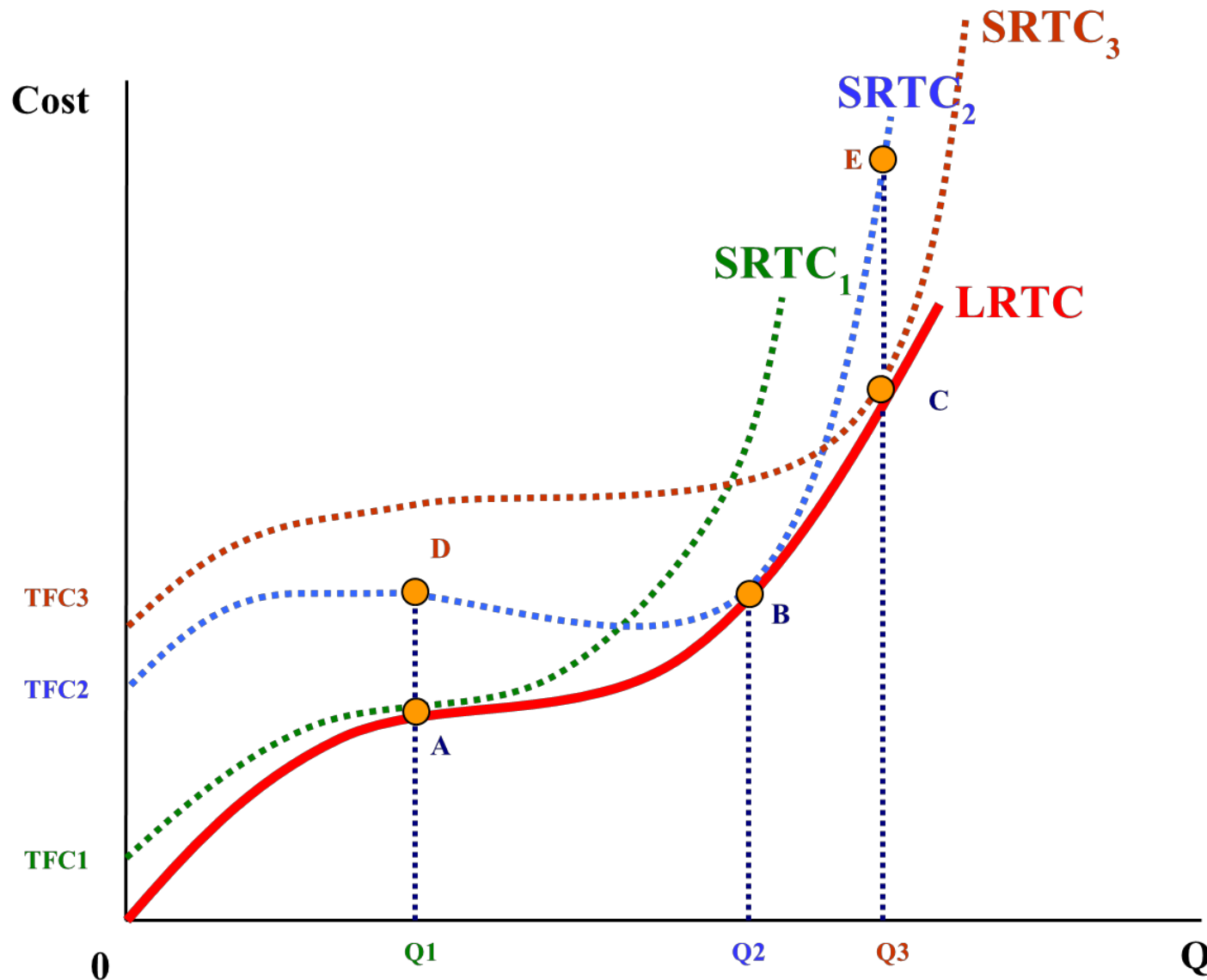
$$\begin{aligned}
 TC_0 &= wL_0^* + rK_0^* \\
 TC_1 &= wL_1^* + rK_1^* \\
 TC_2 &= wL_2^* + rK_2^*
 \end{aligned}$$

} Obtained from least-cost combinations.

Expansion Path & LRTC (1)



Expansion Path & LRTC (2)

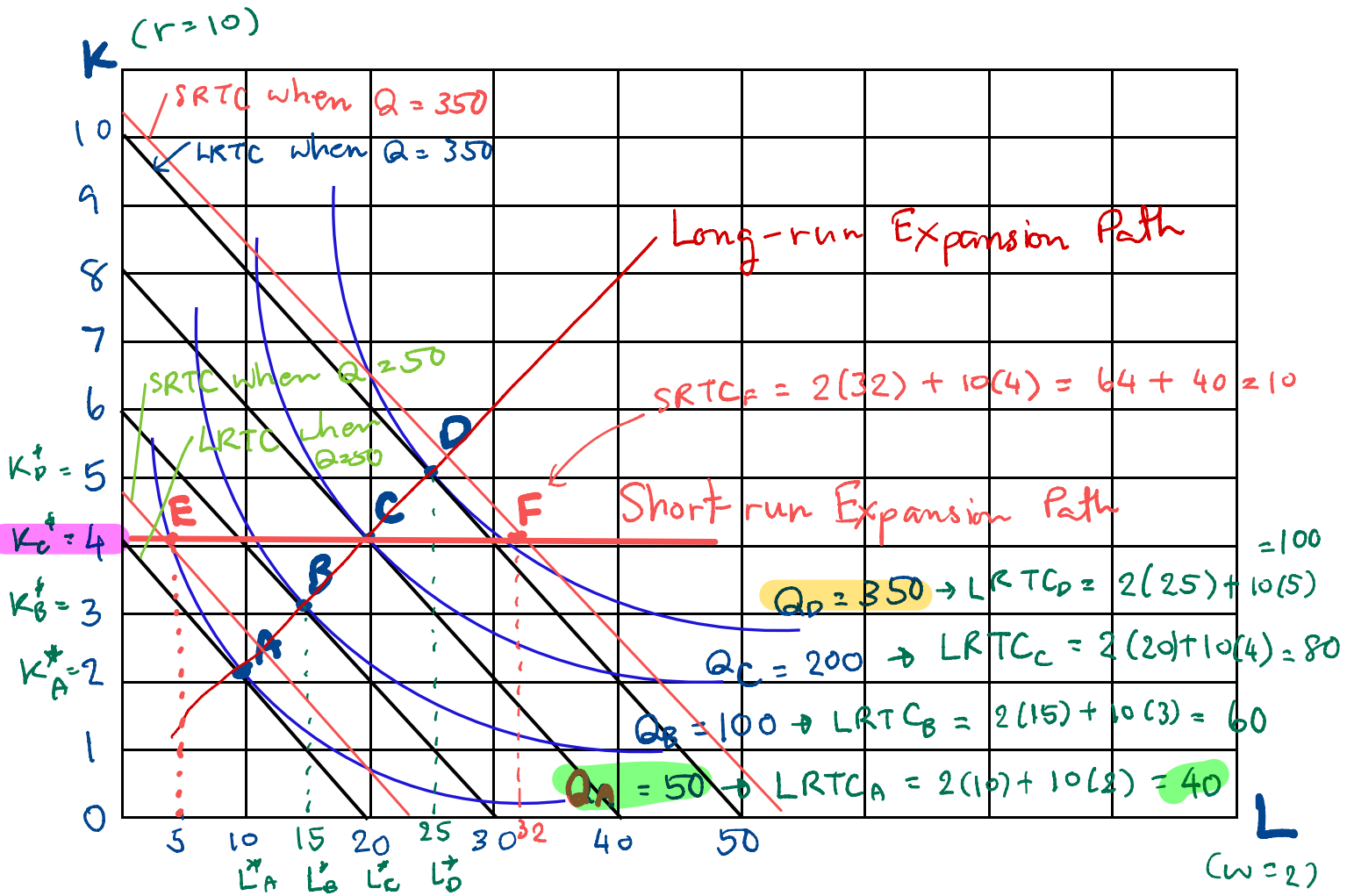


Exercise

- Fill out the missing numbers in the following table, and use this information to draw the LRTC and SRTC, given $w = 2$ and $r = 10$. (Use the attached handout.)

Point	L	K	Q	wL	rK	LRTC	SRTC when K=4
A	10	2	50	20	20	40	n/a
B	15	3	100	30	30	60	n/a
C	20	4	200	40	40	80	n/a
D	25	5	350	50	50	100	n/a
E	5	4	50	10	40	n/a	50
F	32	4	350	64	40	n/a	104

Expansion Path - LRTC



Cost = $wL + rK$ ($w=2, r=10$)

