$F(L, K) = L^{1/4}K^{1/4}$

$L^{LR}_Q = \frac{Q^2 r^{1/2}}{w^{1/2}}$ $\quad K^{LR}_Q = \frac{Q^2 w^{1/2}}{r^{1/2}}$

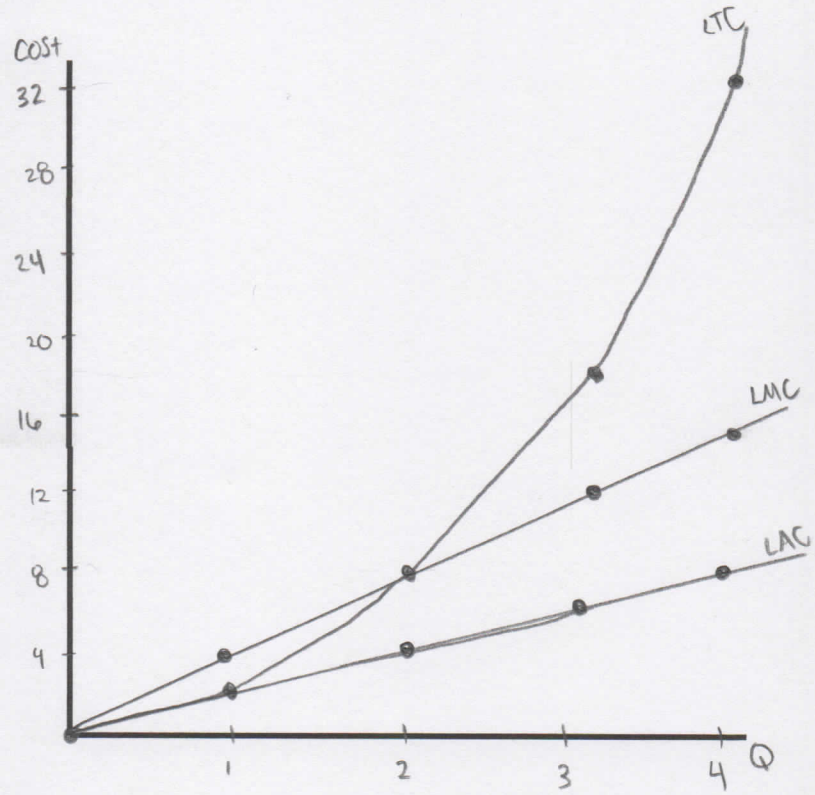
LTC = $\boxed{2Q^2 w^{1/2} r^{1/2}} \xrightarrow[w=r=1]{\text{if}} 2Q^2$

LAC = $\boxed{2Q w^{1/2} r^{1/2}} \xrightarrow[w=r=1]{\text{if}} 2Q$

LMC = $\boxed{4Q w^{1/2} r^{1/2}} \xrightarrow[w=r=1]{\text{if}} 4Q$

Q	LTC	LAC	LMC
0	0	0	0
1	2	2	4
2	8	4	8
3	18	6	12
4	32	8	16

Returns to scale: Decreasing



$F(L, K) = L^{1/2}K^{1/2}$

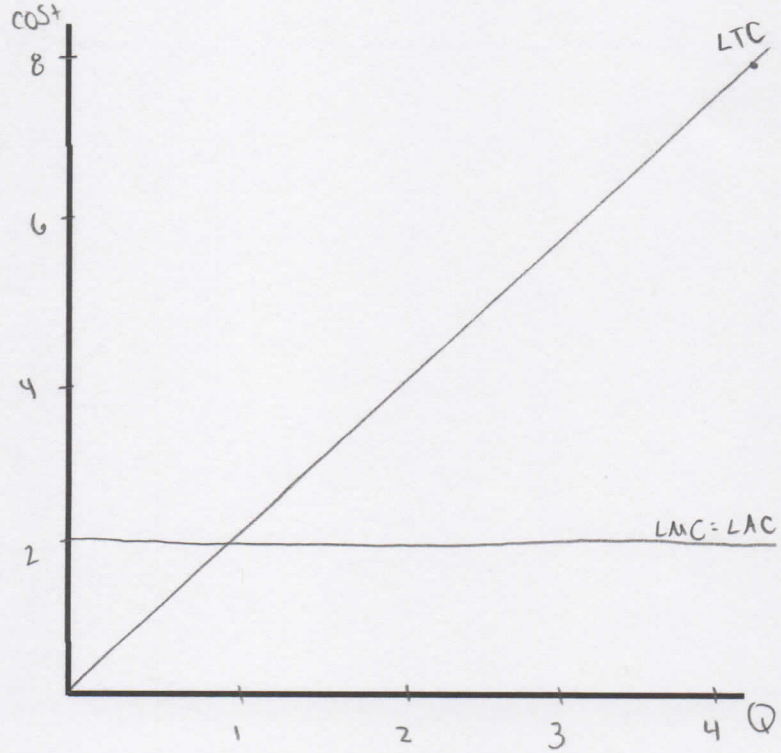
$L^{LR}_Q = \frac{Q r^{1/2}}{w^{1/2}}$ $\quad K^{LR}_Q = \frac{Q w^{1/2}}{r^{1/2}}$

LTC = $\boxed{2Q w^{1/2} r^{1/2}} \xrightarrow[w=r=1]{\text{if}} 2Q$

LAC = $\boxed{2 w^{1/2} r^{1/2}} \xrightarrow[w=r=1]{\text{if}} 2$

LMC = $\boxed{2 w^{1/2} r^{1/2}} \xrightarrow[w=r=1]{\text{if}} 2$

Returns to scale: Constant



F(L, K) = LK

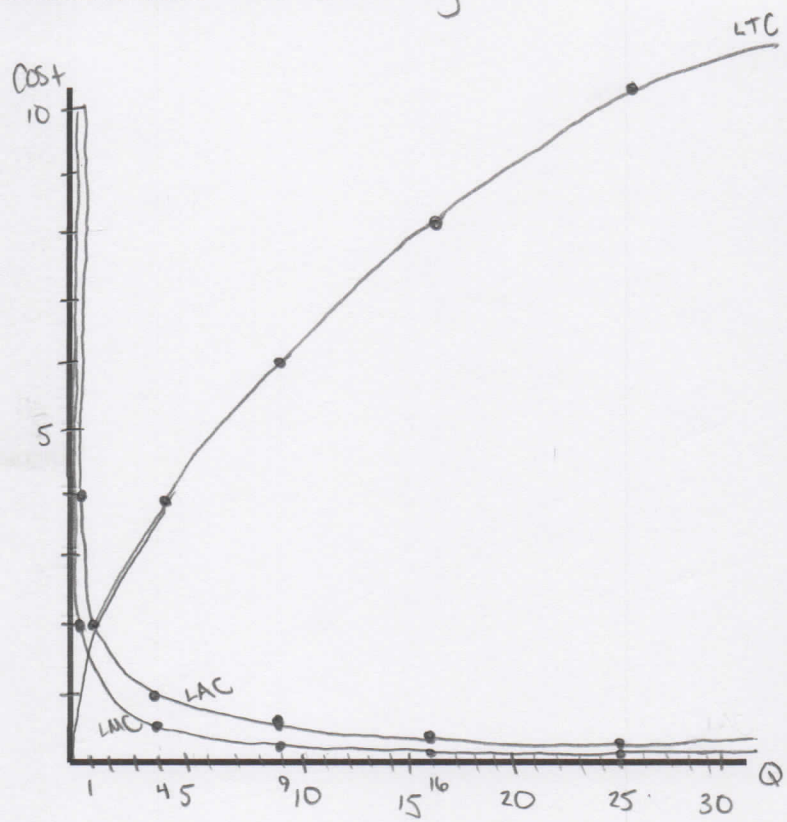
$L^{LR}{}_Q = \frac{Q^{1/2} r^{1/2}}{w^{1/2}}$ $K^{LR}{}_Q = \frac{Q^{1/2} w^{1/2}}{r^{1/2}}$

Returns to scale: Increasing

LTC = $\boxed{2Q^{1/2} w^{1/2} r^{1/2}} \xrightarrow{\text{if } w=r=1} 2Q^{1/2}$

LAC= $\boxed{\frac{2w^{1/2} r^{1/2}}{Q^{1/2}}} \xrightarrow{\text{if } w=r=1} \frac{2}{Q^{1/2}}$

LMC = $\boxed{\frac{w^{1/2} r^{1/2}}{Q^{1/2}}} \xrightarrow{\text{if } w=r=1} \frac{1}{Q^{1/2}}$



Q	LTC	LAC	LMC
1	2	2	1
4	4	1	1/2
9	6	2/3	1/3
16	8	1/2	1/4
25	10	2/5	1/5
1/4		4	2

	Decreasing R.T.S	Increasing R.T.S	Constant R.T.S
Long run total cost	Q↑ → LTC↑ @ ↑ rate	Q↑ → LTC↑ @ ↓ rate	Q↑ → LTC↑ @ – rate (linear)
Long run marginal cost	LMC > LAC	LMC < LAC	LMC = LAC
Long run average cost	Q↑ → LAC↑	Q↑ → LAC↓	Q↑ → LAC –

Short Run Cost Curves

STC = $wL_Q^{SR} + r\bar{K}$

SAC = $\frac{STC}{Q}$

SMC = $\frac{\partial STC}{\partial Q}$

SVC = wL_Q^{SR}

SAVC = $\frac{wL_Q^{SR}}{Q}$

SFC = $r\bar{K}$

SAFC = $\frac{r\bar{K}}{Q}$

Long Run Cost Curves

LTC = $wL_Q^{LR} + rK_Q^{LR}$

LAC = $\frac{LAC}{Q}$

LMC = $\frac{\partial LTC}{\partial Q}$