

4 pts.

1. Doughdaddy is contemplating the input mix he is currently using to make doughnuts in his doughnut shop. Keeping the same number of workers, if he were to upgrade his deep-fat fryer from the current medium size to a large-sized one, daily output of doughnuts would increase by 200 doughnuts. The additional daily cost of leasing the large rather than the medium fryer would be \$25. Alternatively, Doughdaddy could increase output by 400 doughnuts per day by adding another worker to the production process. Each additional worker-day costs him \$80. Is Doughdaddy using the cost-minimizing mix of capital and labor to produce doughnuts? If he wants to increase output, should he use relatively more capital or relatively more labor?

Marginal product of capital =  $MP_K = 200$

Price of capital =  $v = \$25$

Marginal product of labor =  $MP_L = 400$

Price of labor =  $w = \$80$

Does  $MP_K/v = MP_L/w$ ?  $200/25 \neq 400/80$ ! [ $8 > 5$ ]

Since  $MP_K/v > MP_L/w$ , the current input mix uses too much labor relative to capital. If Doughdaddy wants to increase output, he should alter his input mix and use relatively more capital and relatively less labor.

2. The following table describes the short-run production relationship for a firm that produces a single output, Q, with two inputs, L and K:

<b>K</b>	24	24	24	24	24	24
<b>L</b>	0	6	12	18	24	30
<b>Q</b>	0	30	96	162	192	150

- 3 pts. - a. Suppose that the wage rate, w, is \$5. Sketch the firm's total variable cost curve.  
 3 pts. - b. In a separate diagram sketch the firm's average variable cost curve and marginal cost curve.

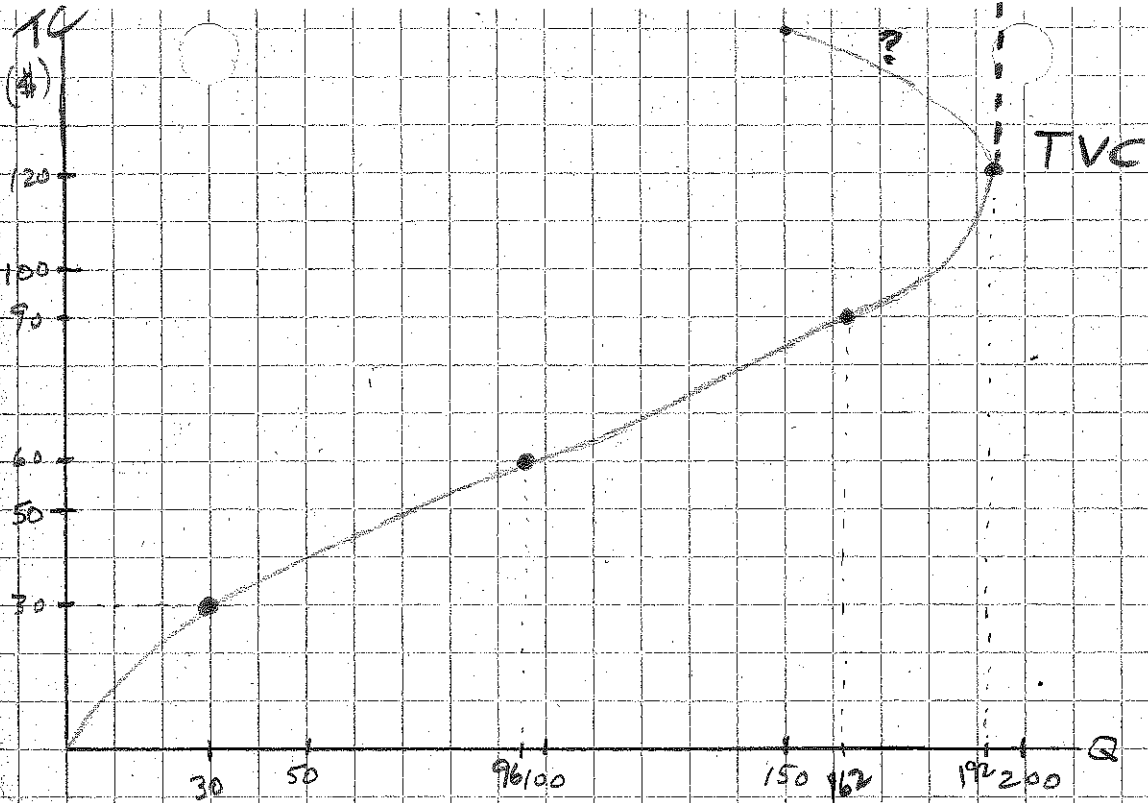
$$TVC = w * L; AVC = TVC / Q; MC = \Delta TVC / \Delta Q$$

<b>Q</b>	0	30	96	162	192	150
<b>TVC</b>	0	\$30	\$60	\$90	\$120	\$150
<b>AVC</b>	--	\$1.00	\$0.625	\$0.555	\$0.625	*
<b>MC</b>	--	\$1.00	\$0.455	\$0.429	\$1.00	*

\*AVC and MC essentially become infinite as the firm tries to expand output beyond  $Q=192$  in the short run when capital is fixed at  $K=24$ . The firm would never use  $K=24$  and  $L = 30$  to produce  $Q=150$ , since the marginal productivity of the 25<sup>th</sup> unit of L is negative.

2.

(a)



(b)

