Econ 301
Deiter
R In-class #10 (10 pts.)

Names Key

Assume	q	=	$200L^{1/2}$, where
	q	=	number of bottles of pop sold by a concession stand at an athletic event
	L	=	number of workers hired for the day for the event
	P	=	the price of pop per bottle = $2.00
	w	=	the daily wage or cost per worker = $40.00
	TFC	=	total fixed costs = $100.00

1. Show mathematically that the amount of L that needs to be hired depends on the desired level of output (q) [i.e., solve for L in the given production function].

$q = 200 L^{1/2} \Rightarrow L^{1/2} = \frac{q}{200} \Rightarrow L = \frac{q^2}{40{,}000} = .000025 q^2$

2. What is the mathematical equation that shows SR TC is a function of q given the assumptions above?

$= TFC + TVC = TFC + WL = TFC + W(.000025 q^2)$

$= 100 + 40(.000025 q^2) = 100 + .001 q^2$

3. Given your answer to Q. #2, what is the mathematical equation that shows MC as a function of q?

$= \frac{dTC}{dq} = (2)(.001) q^{2-1} = .002q$

4. Given your answer to Q. #2, what is the mathematical equation that shows AVC as a function of q?

$= \frac{TVC}{q} = \frac{.001 q^2}{q} = .001 q$

5. Given your answer to Q. #2, what is the mathematical equation that shows AFC as a function of q?

$= \frac{TFC}{q} = \frac{100}{q}$

6. What is the TC of producing Q = 1000?

$= 100 + .001 q^2 = 100 + (.001)(1000)(1000)$

$= 100 + 1000 = 1100$

7. What is the MC of producing and selling another bottle of pop at Q = 1000? (Use equation from Q. #3 to calculate).

$= .002q = (.002)(1000) = \$2.00$

8. What is the AVC of producing at Q = 1000?

$= .001q = (.001)(1000) = \$1.00$

$\rightarrow 1000 = 200\sqrt{L} \Rightarrow \sqrt{L} = 5$

9. What is the value of w/MP_L at Q = 1000?

$w = 40$

$MP_L = \frac{\partial q}{\partial L} = \left(\frac{1}{2}\right)(200) q^{1/2-1} = \frac{100}{\sqrt{L}}$

$\Rightarrow \frac{w}{MP_L} = \frac{40}{100/\sqrt{L}}$

$= \frac{40}{100/5} = \frac{40}{20} = 2.00$

10. What is the AVC of producing at Q = 1000 if w increases to \$50 (from \$40)?

$TVC = w \cdot L = 50(.000025 q^2)$

$= .00125 q^2$

$\Rightarrow AVC = \frac{TVC}{q} = \frac{.00125 q^2}{q} = .00125 q$

$= .00125(1000)$

$= \$1.25$