

Lab 5_Answers MD

Q.1 Note $MP_1 = \frac{\Delta y}{\Delta z_1} = 2$

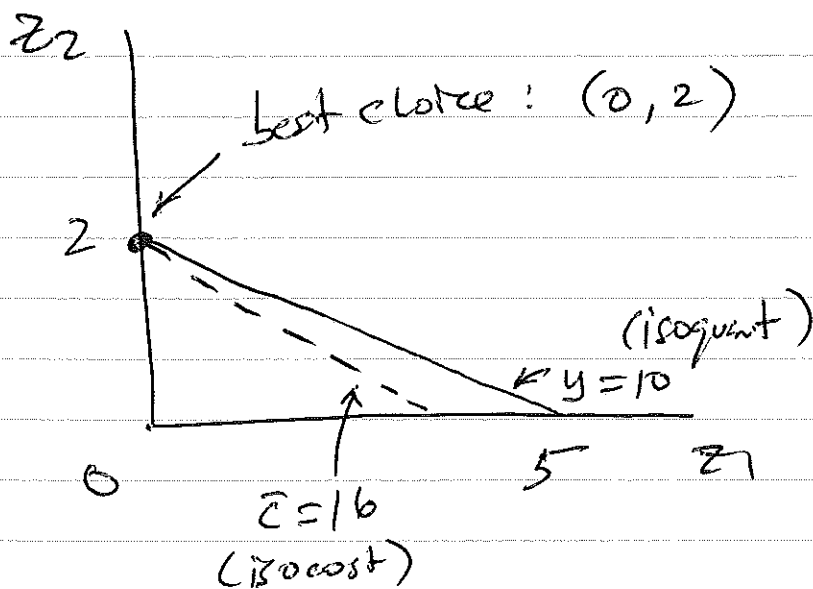
$$MP_2 = \frac{\Delta y}{\Delta z_2} = 5 \leftarrow \text{higher skill}$$

• Here $\frac{MP_1}{MP_2} = \frac{2}{5}$ $\frac{w_1}{w_2} = \frac{4}{8} = \frac{1}{2}$

so $\frac{MP_1}{MP_2} < \frac{w_1}{w_2} \Rightarrow$ Use only z_2

so $y = 2(0) + 5z_2$, $z_2 = \frac{y}{5}$

$$C(y) = w_1 z_1 + w_2 z_2 = \frac{8y}{5}$$



If $y = 10$
 $C(10) = \frac{8(10)}{5}$
 $= 16$

When $w_2 = 12$, $\frac{w_1}{w_2} = \frac{4}{12} = \frac{1}{3} < \frac{2}{5}$

Now : since $3\sqrt{z_1} = y$

$$\sqrt{z_1} = y/3$$

$$z_1 = (y/3)^2 \quad \left. \begin{array}{l} \text{conditional} \\ \text{input} \\ D. \end{array} \right\}$$

$$\begin{aligned} VC(y) &= w_1 \cdot z_1(y) \\ &= 18 \cdot \frac{y^2}{9} = 2y^2 \end{aligned}$$

$$FC = 9 \cdot 8 = 72$$

$$TC(y) = 2y^2 + 72$$

$$AVC(y) = 2y^2/y = 2y$$

$$AFC(y) = 72/y$$

$$AC(y) = 2y + 72/y$$

$$MC(y) = 4y \quad [\text{Given}]$$

$$MC = AC :$$

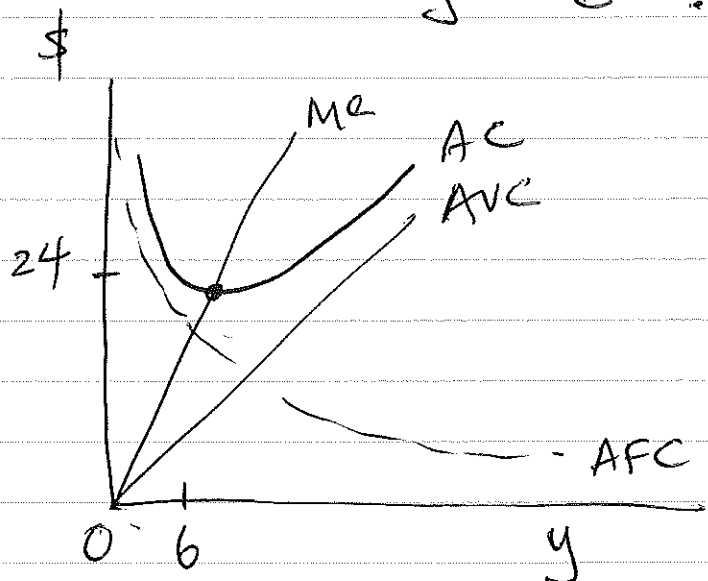
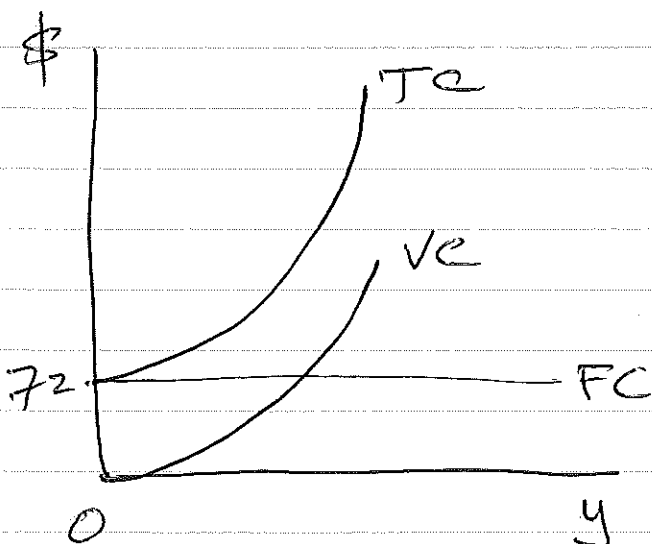
$$4y = 2y + 72/y$$

$$2y = 72/y$$

$$2y^2 = 72$$

$$y^2 = 36$$

$$y = 6 !$$



Use only z_1 now

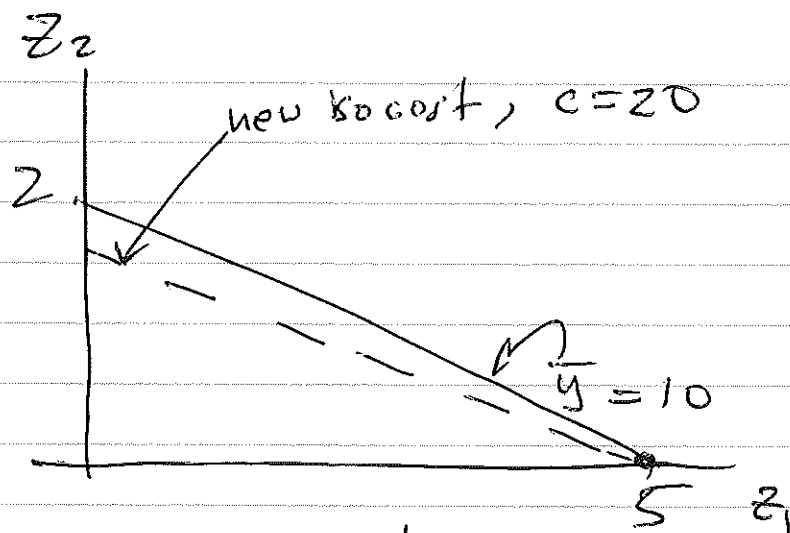
$$y = 2z_1 + 5(0)$$

$$z_1 = y/2$$

$$C(y) = w_1 \cdot z_1 \\ = 4y/2$$

$$= 2y \cdot \text{If } y = 10$$

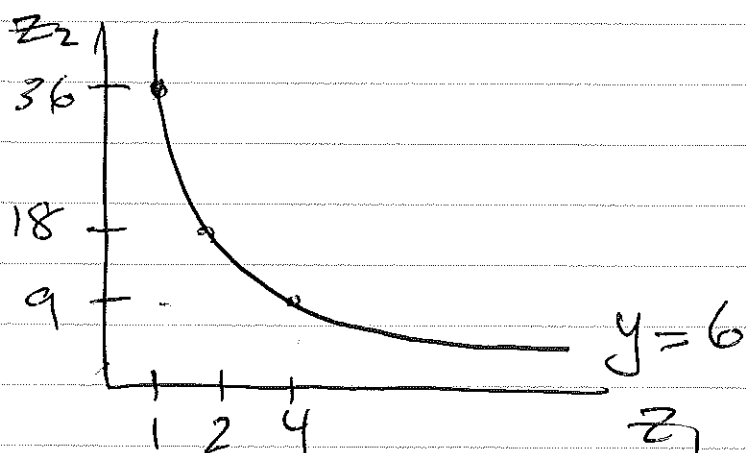
$$C(10) = 20 \quad (\text{use } 5 z_1)$$



Q2 $y = (z_1 \cdot z_2)^{1/2} = \sqrt{z_1 \cdot z_2} = f(z_1, z_2)$

If $y = 6$, $6 = \sqrt{z_1 \cdot z_2}$

$$36 = z_1 \cdot z_2, \quad z_2 = 36/z_1$$



• Let $z_2 = 9$, $TP(z_1) = f(z_1, 9)$
 $= \sqrt{9z_1}$
 $= 3 \cdot \sqrt{z_1} = y$

$$\text{If } y=12, \quad z_1 = (12/3)^2 = 4^2 = 16$$

$$TC(12) = 2(12)^2 + 72 = 360$$

- use 16 z_1 , costs $16 \times 18 = 288$

- use 9 z_2 , costs 72

• If $z_2 = 16$, $y = \sqrt{16 z_1} = 4\sqrt{z_1}$

so $\sqrt{z_1} = y/4$, $z_1(y) = y^2/16$

$$\left. \begin{array}{l} VC(y) = 18(y^2/16) \\ FC = 16 \times 8 = 128 \end{array} \right\} TC(y) = \frac{9}{8}y^2 + 128$$

$$\begin{aligned} \text{If } y=12, \quad TC(12) &= \frac{9}{8}(12)^2 + 128 \\ &= \frac{9}{8}(144) + 128 \\ &= 290! \end{aligned}$$

$$\text{use } z_1 = \frac{(12)^2}{16} = \frac{144}{16} = 9$$

$$\text{This costs } 9 \times 18 = \$162$$

↖ cost
LOWER
NOW!
(z_1 is more
productive)

Q3. $TRS = z_2/z_1$ always

$$\text{Set } z_2/z_1 = w_1/w_2 = 1 \rightarrow \boxed{z_1 = z_2}$$

$$a = 1 : f(2z_1, 2z_2) = (2z_1)(2z_2) = 4z_1 \cdot z_2 > 2f(z_1, z_2)$$

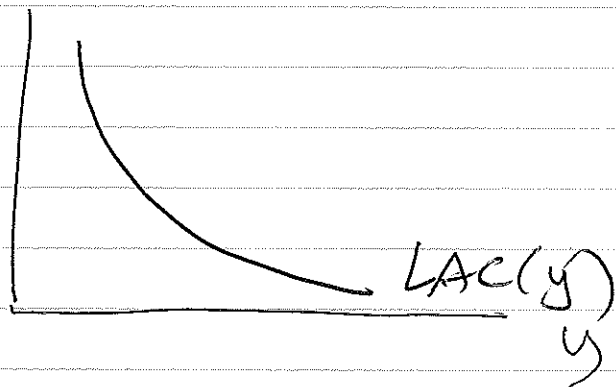
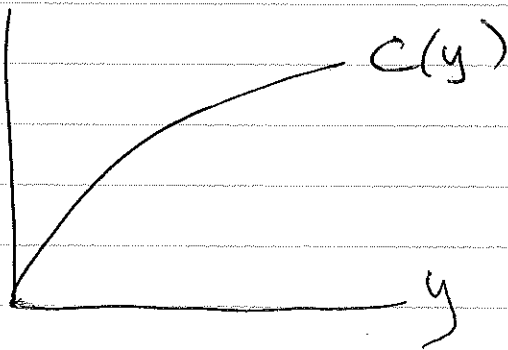
Increasingly rts.

$$z_2 = z_1 \rightarrow y = z_1 \cdot z_1 = z_1^2$$

$$z_1(y) = \sqrt{y} = z_2(y)$$

$$C(y) = 2\sqrt{y}$$

$$LAC = \frac{C(y)}{y} = \frac{2\sqrt{y}}{y} = \frac{2}{\sqrt{y}}$$



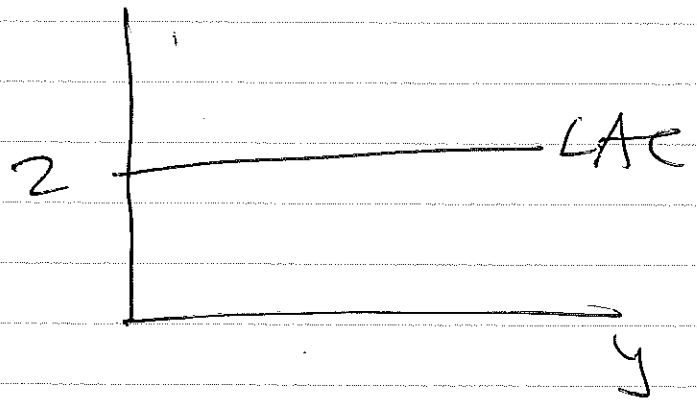
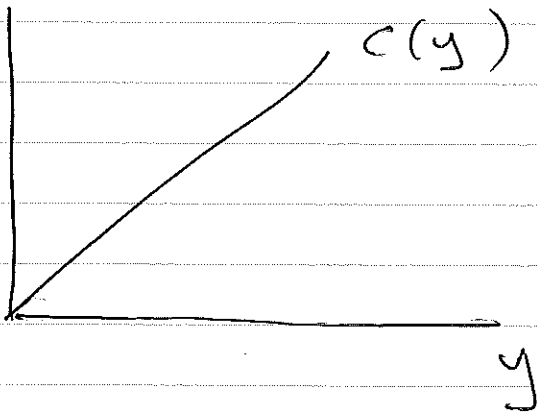
$$a = 1/2 \text{ (constant)} \quad f(2z_1, 2z_2) = (2z_1 \cdot 2z_2)^{1/2} = (4(z_1 \cdot z_2))^{1/2} = 2(z_1 \cdot z_2)^{1/2} = 2f(z_1, z_2)$$

Constant rts

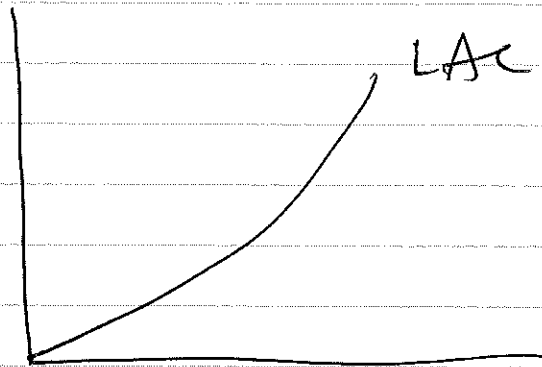
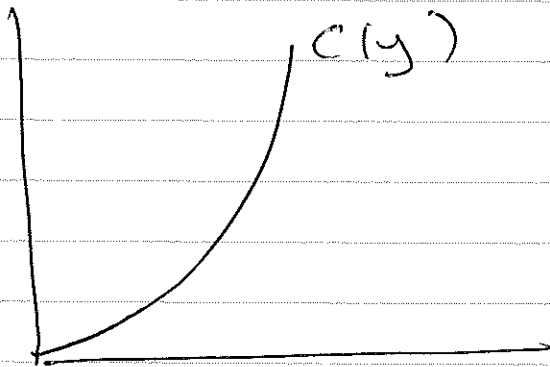
$$z_2 = z_1 \rightarrow y = (z_1 \cdot z_2)^{1/2} \\ y = (z_1 \cdot z_1)^{1/2} \\ y = z_1$$

$$z_1(y) = y, \quad z_2(y) = y, \quad C(y) = 2y$$

$$LAC = 2y/y = 2$$



$a = 1/4$, $f(z_1, z_2) = (2z_1 \cdot 2z_2)^{1/4}$
 decreasing \hookrightarrow can show drts



END