

Closing Tue: Sup 6-7

Closing Wed: Sup 8-9

Read Sup 8-9 and my four page summary review of Sup 1-9.

Supp. 9: AC, AVC, and AR

New terms:

$$AC(q) = \frac{TC(q)}{q}$$

= **average cost** to make q items

= slope of the **diag. line to TC** at q

$$AVC(q) = \frac{VC(q)}{q}$$

= **ave. variable cost** to make q items

= slope of the **diag. line to VC** at q

$$AR(q) = \frac{TR(q)}{q}$$

= **average revenue** in selling q items

= slope of the **diag. line to TR** at q

Entry Task:

Get out the paperweights graph.

By drawing appropriate lines and computing slopes estimate:

1. MC(200)

2. AC(300)

3. AVC(700)

1] MC(200) \approx SLOPE OF THE TANGENT TO TC AT 200

DRAW LINE \Rightarrow 2 PTS (150, 875) (700, 1250)

$$\text{SLOPE} = \frac{1250 - 875}{700 - 150} \approx \boxed{0.68 \text{ \$/item}}$$

SO IT COSTS \$0.68 TO PRODUCE THE 201ST ITEM (FROM 200 TO 201)

2] AC(300) = DIAG. SLOPE AT 300 ON TC

DRAW LINE \Rightarrow 2 PTS (0, 0) (650, 2000)

$$\text{SLOPE} = \frac{2000 - 0}{650 - 0} \approx \boxed{3.08 \text{ \$/item}}$$

ON AVERAGE IT COSTS \$3.08 /item TO PRODUCE 300 items (including FC!)

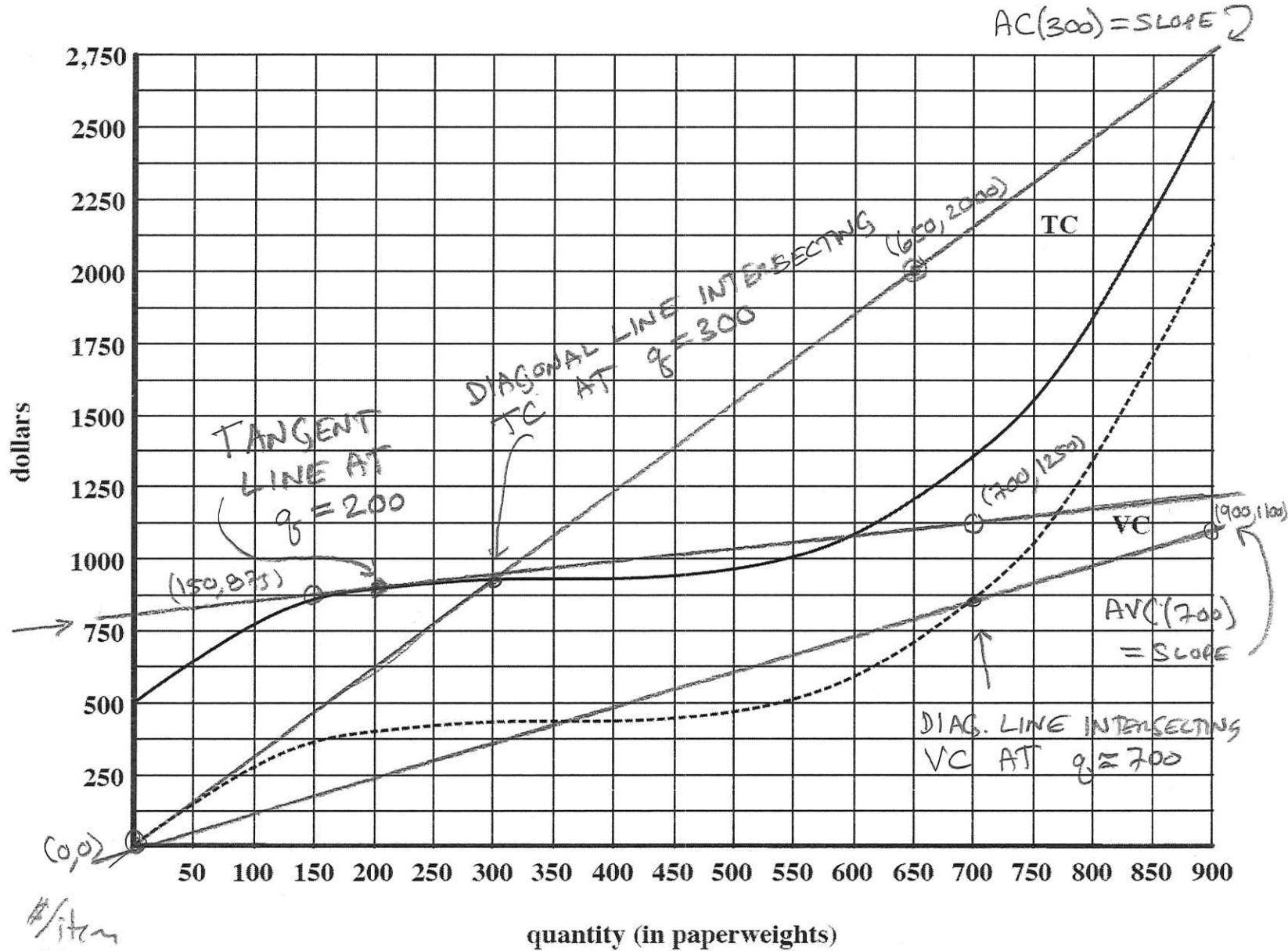
3] AVC(700) = DIAG. SLOPE AT 700 ON VC

DRAW LINE \Rightarrow 2 PTS (0, 0) (900, 1100)

$$\text{SLOPE} = \frac{1100 - 0}{900 - 0} \approx \boxed{1.22 \text{ \$/item}}$$

AVE. COST TO PRODUCE 700 ITEMS IS \$1.22/item (NOT INCLUDING FC)

Paperweights cost analysis



$MC(200) \approx 0.68$ \$/item
 $AC(300) \approx 3.08$ \$/item
 $AVC(700) \approx 1.22$ \$/item

Notes about AC, AVC, and AR:

1. They give "overall" rate info,
but all are diagonal lines!

2. AC(q) includes FC in the average (because TC(q) includes FC).

3. AVC(q) does not include FC.

4. AR(q) is the same as price per item.

$$AC(q) = \frac{TC(q)}{q} = \frac{(FC + VC(q))}{q}$$

FC HERE

$$AVC(q) = \frac{VC(q)}{q}$$

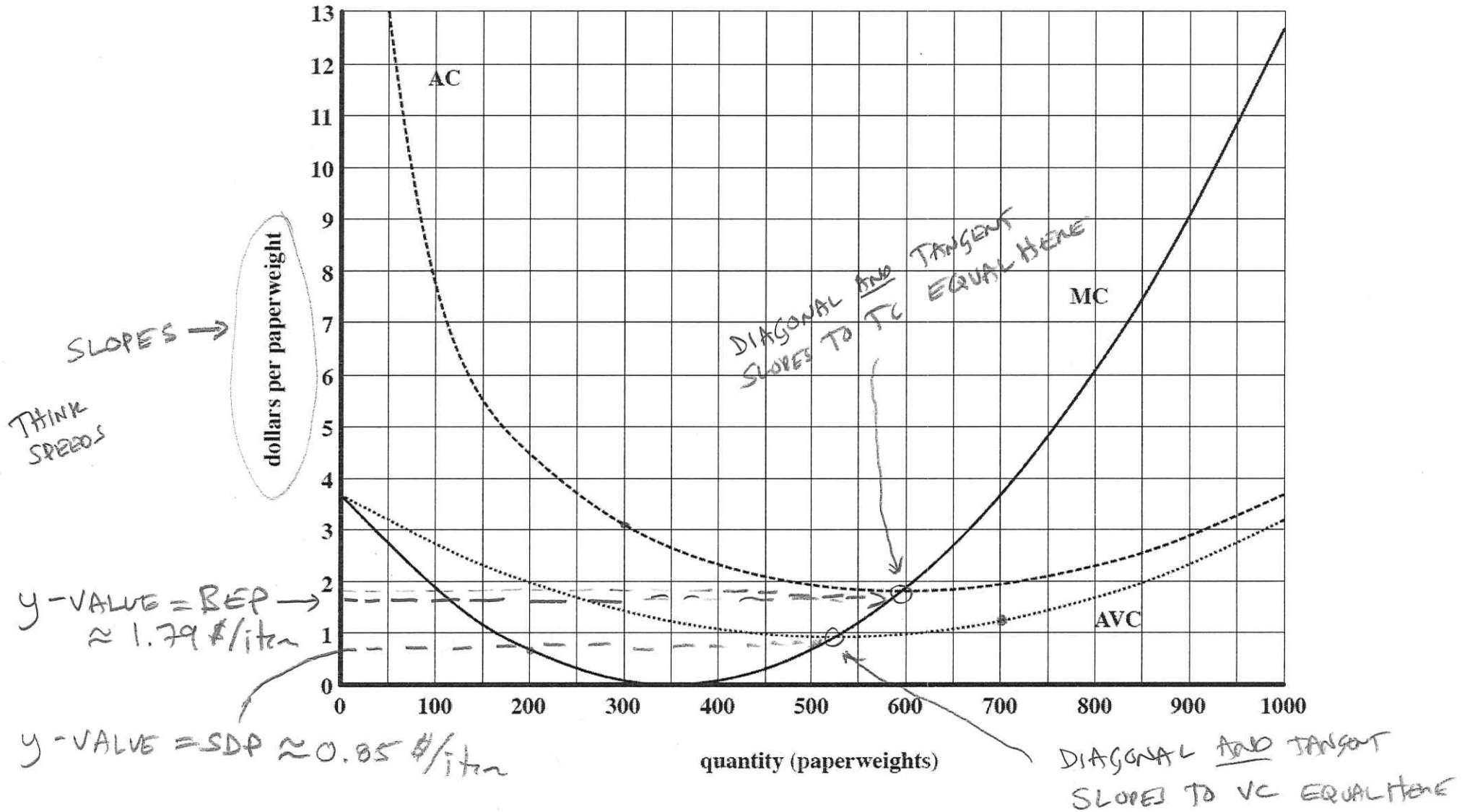
NO FC HERE

$$AR(q) = \frac{Tr(q)}{q} = \frac{(PRICE)(QUANTITY)}{(QUANTITY)}$$

By computing slopes, we get...

Then plotting these...

q	100	200	300	400	500	600	700	800	900	1000
MC	1.88	0.68	0.08	0.08	0.68	1.88	3.68	6.08	9.08	12.68
AC	7.73	4.48	3.08	2.33	1.93	1.81	1.94	2.30	2.88	3.68
AVC	2.73	1.98	1.43	1.08	0.93	0.98	1.22	1.68	2.33	3.18



Key Concept Review/Observations

Go back to the TC, VC graphs

1. Compute:

- A) Breakeven price (BEP)
- B) Shutdown price (SDP)

Now look at the AC, AVC, MC graph.

Any observations? AC

LOWEST DIAGONAL SLOPE TO TC IS ALSO A TANGENT TO TC

MC
SO $\boxed{\text{BEP} = \text{SLOPE WHEN } AC = MC}$

SIMILARLY

$\boxed{\text{SDP} = \text{SLOPE WHEN } AVC = MC}$

RECALL:

BEP = SLOPE OF LOWEST DIAGONAL (TR) LINE THAT TOUCHES TC

DRAW LINE \Rightarrow 2 PTS (0,0) (700, 1250)

$$\boxed{\text{BEP} = \frac{1250 - 0}{700 - 0} \approx 1.79 \text{ \$/ITEM}}$$

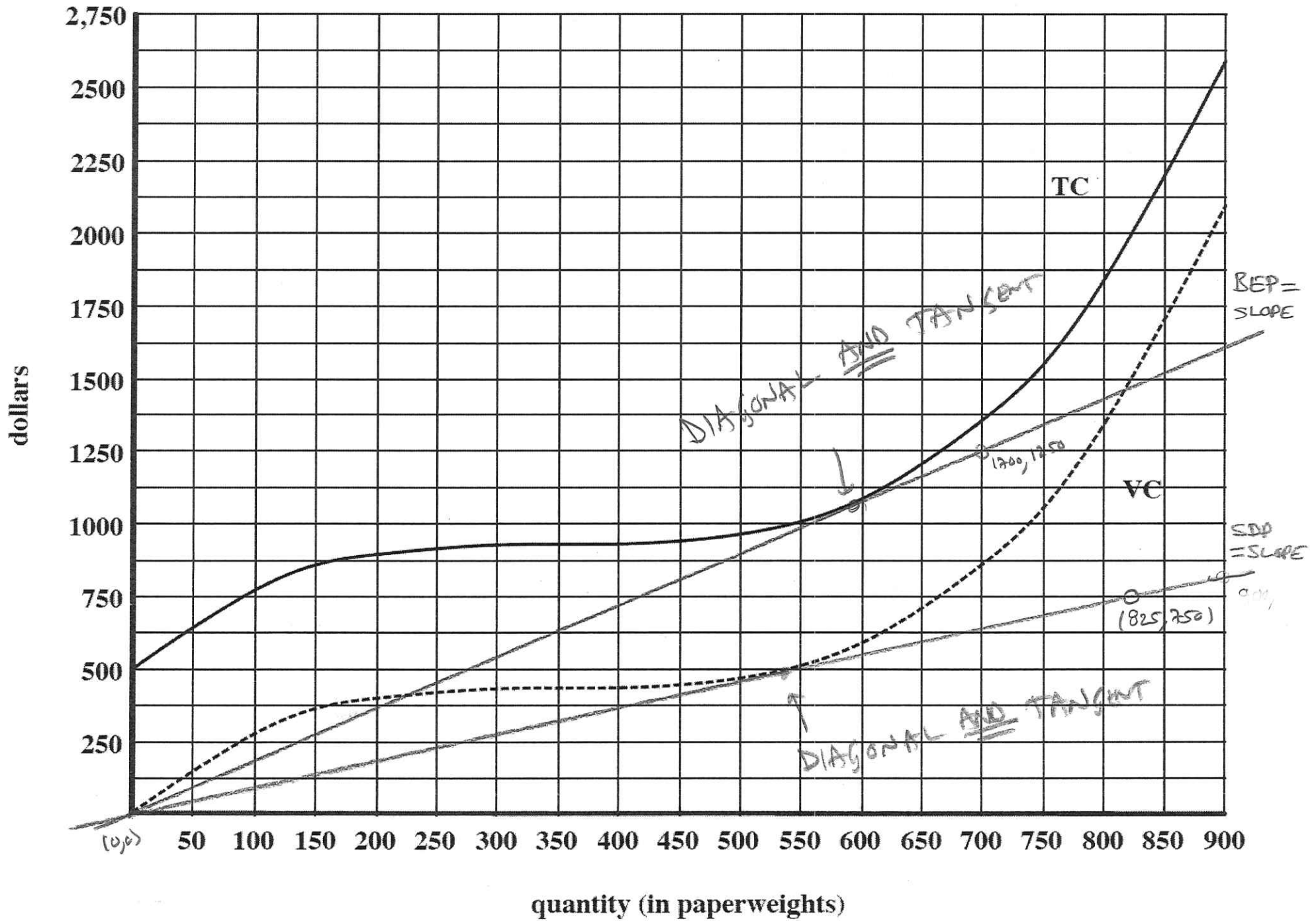
- IF SELLING PRICE $>$ 1.79/item THEN POSITIVE PROFIT IS POSSIBLE. (CAN BREAK EVEN)
- IF SELLING PRICE $<$ 1.79/item THEN POSITIVE PROFIT IS NOT POSSIBLE.

SDP = SLOPE OF LOWEST DIAGONAL (TR) LINE THAT TOUCHES VC

DRAW LINE \Rightarrow 2 PTS (0,0) (825, 750)

$$\boxed{\text{SDP} = \frac{750 - 0}{825 - 0} \approx 0.91 \text{ \$/item}}$$

- IF SELLING PRICE $>$ 0.91/item THEN IT IS POSSIBLE TO RECOVER SOME FC.
- IF SELLING PRICE $<$ 0.91/item THEN IT IS NOT POSSIBLE TO RECOVER ANY FC.
(YOU WILL LOSE MORE THAN FC IF YOU STAY OPEN, SHUT DOWN!)



Again, go back to the TC, VC graphs
2. Assume the market price for
is 2.50 dollars/paperweight.

Before you do anything else, is a
positive profit possible?

A) Draw TR. What is your profit for:

- i) $q = 50$?
- ii) $q = 400$?

B) What quantity maximizes profit?

What is the maximum profit?

C) What would the **MR graph** look
like? Draw it with the MC, AC,
AVC graphs.

Any observations?

A

$$P(50) = TR(50) - TC(50)$$
$$\approx 125 - 650 = -525 \text{ dollars}$$

WILL LOSE ABOUT \$525
(more than FC!)

$$P(400) = TR(400) - TC(400)$$
$$\approx 1000 - 900 = 100 \text{ dollars}$$

B MATCH SLOPES!

ABOUT $q \approx 620$ ITEMS

$$\text{MAX PROFIT} = TR(620) - TC(620)$$
$$\approx 1550 - 1125 = 425 \text{ DOLLARS}$$

C MR = "SLOPE OF TANGENT TO TR"

$$= 2.50 \text{ \$/item ALWAYS FOR THIS TR}$$

MR = 2.50 CONSTANT (HORIZONTAL GRAPH)

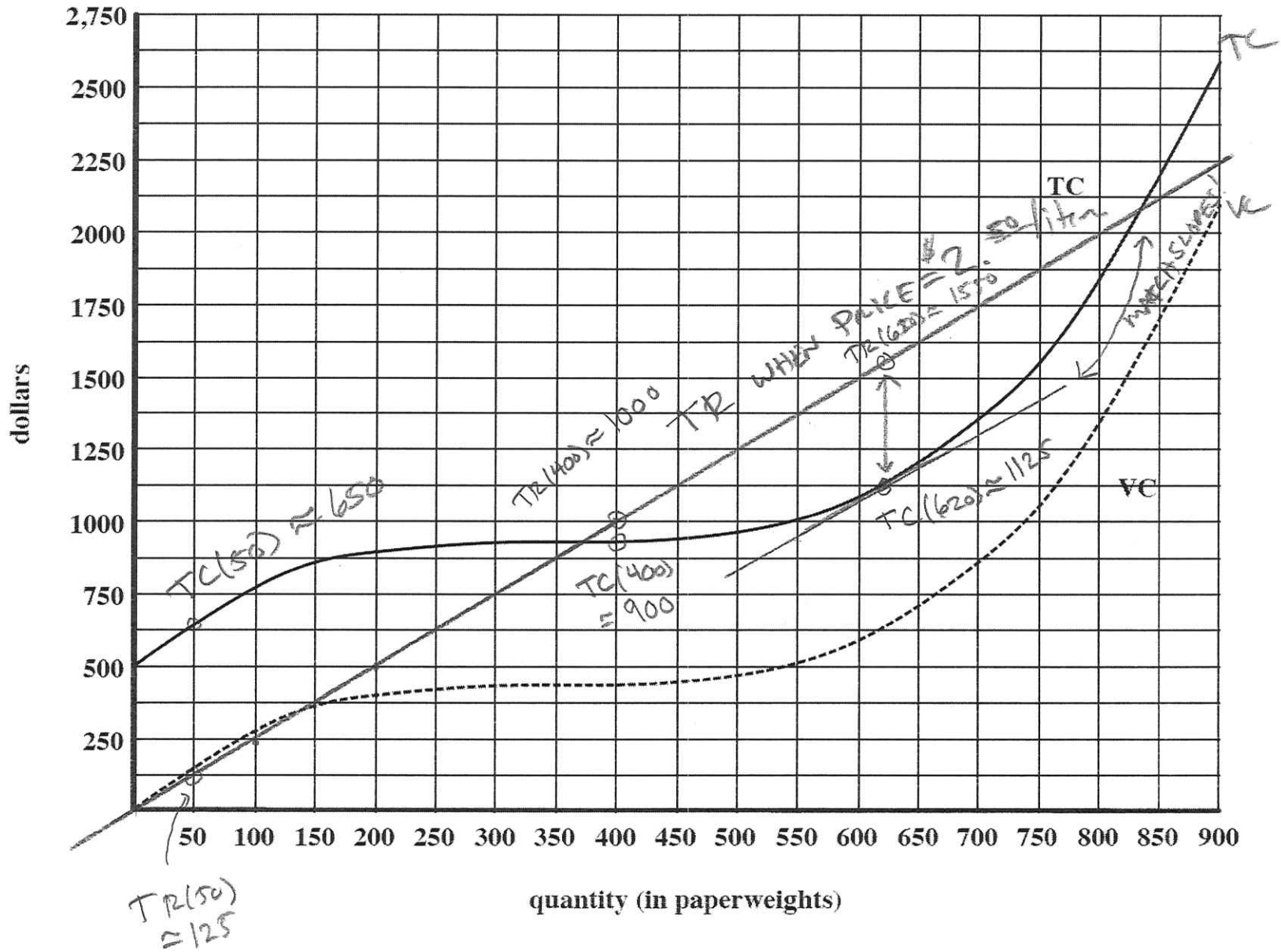
DRAW MR

WHEN DOES MR = MC

TR WHEN PRICE = 2.50 \$/item

(0,0) (100,250)
(200,500), ...

Paperweights cost analysis



By computing slopes, we get...

Then plotting these...

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