

Mathematical Cost Functions(2)

$$C = 10 + 20q + 4q^2$$

A Problem

$$C = 10 + 20q + 4q^2$$

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- Compute TC, AC, and MC when $q=10$

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- Find where $MC = AC$

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- What level of output minimizes AC?

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- Find where $MC = AC$
- What level of output minimizes AC?
- When is $MC = 60$?

$$C = 10 + 20q + 4q^2$$

- Compute TC, AC, and MC when $q=10$

$$TC = 10 + 20(10) + 4(10)^2$$

$$C = 10 + 20q + 4q^2$$

- Compute TC, AC, and MC when $q=10$

$$TC = 10 + 20(10) + 4(10)^2$$

$$TC = 10 + 200 + 400 = 610$$

$$C = 10 + 20q + 4q^2$$

Compute AC

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

$$AC = \frac{10 + 20q + 4q^2}{q}$$

$$C = 10 + 20q + 4q^2$$

Compute AC

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

$$AC = \frac{10 + 20q + 4q^2}{q}$$

$$AC = \frac{10}{q} + 20 + 4q$$

$$C = 10 + 20q + 4q^2$$

Compute AC

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

$$AC = \frac{10 + 20q + 4q^2}{q}$$

$$AC = \frac{10}{q} + 20 + 4q$$

$$AC = \frac{10}{10} + 20 + 4(10) = 61$$

$$C = 10 + 20q + 4q^2$$

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•The derivative of

$$ax^2 + bx + c$$

is

$$2ax + b$$

$$C = 10 + 20q + 4q^2$$

•The derivative of

$$ax^2 + bx + c \quad MC = 8q + 20$$

is

$$MC = 100$$

$$2ax + b$$

$$C = 10 + 20q + 4q^2$$

Find where MC = AC

$$AC = \frac{10}{q} + 20 + 4q$$

$$MC = 8q + 20$$

$$C = 10 + 20q + 4q^2$$

Find where MC = AC

$$AC = \frac{10}{q} + 20 + 4q$$

$$MC = 8q + 20$$

$$\frac{10}{q} + 20 + 4q = 8q + 20$$

$$C = 10 + 20q + 4q^2$$

Find where MC = AC

$$AC = \frac{10}{q} + 20 + 4q$$

$$MC = 8q + 20$$

$$\frac{10}{q} + 20 + 4q = 8q + 20$$

$$\frac{10}{q} = 4q$$

$$C = 10 + 20q + 4q^2$$

Find where MC = AC

$$\frac{10}{q} = 4q$$

$$10 = 4q^2$$

$$q = \sqrt{2.5} \cong 1.58$$

$$C = 10 + 20q + 4q^2$$

What level of output minimizes AC?

$$AC = \frac{10}{q} + 20 + 4q$$

$$C = 10 + 20q + 4q^2$$

What level of output minimizes AC?

$$AC = \frac{10}{q} + 20 + 4q$$

$$\frac{dAC}{dq} = \frac{-10}{q^2} + 4 = 0$$

$$C = 10 + 20q + 4q^2$$

What level of output minimizes AC?

$$AC = \frac{10}{q} + 20 + 4q$$

$$\frac{dAC}{dq} = \frac{-10}{q^2} + 4 = 0$$

$$4q^2 = 10$$

$$q \cong 1.58$$

$$C = 10 + 20q + 4q^2$$

What level of output minimizes AC?

$$AC = \frac{10}{q} + 20 + 4q$$

$$\frac{dAC}{dq} = \frac{-10}{q^2} + 4 = 0$$

$$4q^2 = 10$$

$$q \cong 1.58$$

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**MC = AC at the
minimum of AC**

$$C = 10 + 20q + 4q^2$$

When is MC = 60?

$$MC = 8q + 20$$

$$8q + 20 = 60$$

$$8q = 40$$

$$q = 5$$

End

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