

Solving the Problem

$$C = 5 + 10q^2$$

A Problem

$$C = 5 + 10q^2$$

- Find TC, AC, and MC when $q=10$
- Find where $MC = AC$
- What level of output minimizes AC?
- When is $MC = 60$?

Finding TC, AC and MC ($q=10$)

$$C = 5 + 10q^2$$

$$TC = 5 + 10(10)^2$$

$$TC = 5 + 10(100) = 1005$$

Finding AC

$$C = 5 + 10q^2$$

Finding AC

$$C = 5 + 10q^2$$

$$AC = \frac{TC}{q} = \frac{1005}{10} = 100.5$$

Finding AC

$$C = 5 + 10q^2$$

$$AC = \frac{C(q)}{q}$$
$$AC = \frac{5 + 10q^2}{q}$$

Finding AC

$$C = 5 + 10q^2$$

$$AC = \frac{C(q)}{q}$$
$$AC = \frac{5 + 10q^2}{q}$$
$$AC = \frac{5}{q} + 10q$$
$$AC = \frac{5}{10} + 10(10) = 100.5$$

Finding MC

$$C = 5 + 10q^2$$

Finding MC

$$C = 5 + 10q^2$$

- The derivative of

$$ax^2 + bx + c$$

is

$$2ax + b$$

Finding MC

$$C = 5 + 10q^2$$

- The derivative of

$$ax^2 + bx + c$$

is

$$2ax + b$$

$$MC = 20q$$

$$MC = 200$$

Find where MC = AC

$$C = 5 + 10q^2$$

Find where MC = AC

$$C = 5 + 10q^2$$

$$AC = \frac{5}{q} + 10q$$

$$MC = 20q$$

Find where MC = AC

$$C = 5 + 10q^2$$

$$AC = \frac{5}{q} + 10q$$

$$MC = 20q$$

$$\frac{5}{q} + 10q = 20q$$

Find where MC = AC

$$C = 5 + 10q^2$$

$$\frac{5}{Q} + 10q = 20q$$

$10q$

The Last Step

$$C = 5 + 10q^2$$

Find where MC = AC

$$\frac{5}{q} = 10q$$

$$5 = 10q^2$$

$$q = \sqrt{0.5} \cong 0.707$$

Minimizing AC

$$C = 5 + 10q^2$$

Minimizing AC

$$C = 5 + 10q^2$$

Method I

$$C = 5 + 10q^2$$

$$AC = \frac{5}{q} + 10q$$

Method I

$$C = 5 + 10q^2$$

$$AC = \frac{5}{q} + 10q$$

$$\frac{dAC}{dq} = \frac{-5}{q^2} + 10 = 0$$

Method I

$$C = 5 + 10q^2$$

$$\frac{-5}{q^2} + 10 = 0$$

$$10q^2 = 5$$

$$q \cong 0.707$$

Method I

$$C = 5 + 10q^2$$

$$\frac{-5}{q^2} + 10 = 0$$

$$10q^2 = 5$$

$$q \cong 0.707$$

$$q \cong 0.707$$

Method II

$$C = 5 + 10q^2$$

$$MC = AC$$

$$q = \frac{1}{2}\sqrt{2} \cong 0.707$$

When is $MC = 60$

$$C = 5 + 10q^2$$

When is $MC = 60$?

When is $MC = 60$

$$C = 5 + 10q^2$$

When is $MC = 60$?

$$MC = 20q$$

$$20q = 60$$

$$q = 3$$

A Tabular Solution

$$C = 5 + 10q^2$$

- Compute TC, AC, and MC when $q=10$
- Find where $MC = AC$
- What level of output minimizes AC?
- When is $MC = 60$?

A Tabular Solution

| Q | C | AC | MC |
|----|------|-------|-----|
| 0 | 5 | | |
| 1 | 15 | 15.0 | 10 |
| 2 | 45 | 22.5 | 30 |
| 3 | 95 | 31.7 | 50 |
| 4 | 165 | 41.3 | 70 |
| 5 | 255 | 51.0 | 90 |
| 6 | 365 | 60.8 | 110 |
| 7 | 495 | 70.7 | 130 |
| 8 | 645 | 80.6 | 150 |
| 9 | 815 | 90.6 | 170 |
| 10 | 1005 | 100.5 | 190 |

**Left
for
you to
do**

End

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