

Mathematical Cost Functions(3)

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

A Tabular Solution

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

- 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	10		
1	34		
2	66		
3	106		
4	154		
5	210		
6	274		
7	346		
8	426		
9	514		
10	610		

A Tabular Solution

Q	C	AC	MC
0	10		
1	34		
2	66		
3	106		
4	154		
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$$C = 10 + 20q + 4q^2$$

$$C = 10 + 20(3) + 4(3^2)$$

A Tabular Solution

Q	C	AC	MC
0	10		
1	34		
2	66		
3	106		
4	154		
5	210		
6	274		
7	346		
8	426		
9	514		
10	610		

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

$$C = 10 + 20(3) + 4(3^2)$$

$$C = 10 + 60 + 36$$

$$C = 106$$

A Tabular Solution

$$AC(3) = 106/3 = 35.3$$

Q	C	AC	MC
0	10	NA	NA
1	34	34.0	24
2	66	33.0	32
3	106	35.3	40
4	154	38.5	48
5	210	42.0	56
6	274	45.7	64
7	346	49.4	72
8	426	53.3	80
9	514	57.1	88
10	610	61.0	96

A Tabular Solution

$$MC(4) = 154 - 106 = 48$$

Q	C	AC	MC
0	10	NA	NA
1	34	34.0	24
2	66	33.0	32
3	106	35.3	40
4	154	38.5	48
5	210	42.0	56
6	274	45.7	64
7	346	49.4	72
8	426	53.3	80
9	514	57.1	88
10	610	61.0	96

A Tabular Solution

Compute TC, AC, & MC when Q = 10

Q	C	AC	MC
0	10	NA	NA
1	34	34.0	24
2	66	33.0	32
3	106	35.3	40
4	154	38.5	48
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6	274	45.7	64
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A Tabular Solution

Find where MC = AC

What level minimizes AC?

Q	C	AC	MC
0	10	NA	NA
1	34	34.0	24
2	66	33.0	32
3	106	35.3	40
4	154	38.5	48
5	210	42.0	56
6	274	45.7	64
7	346	49.4	72
8	426	53.3	80
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A Tabular Solution

Where is MC = 60?

Q	C	AC	MC
0	10	NA	NA
1	34	34.0	24
2	66	33.0	32
3	106	35.3	40
4	154	38.5	48
5	210	42.0	56
6	274	45.7	64
7	346	49.4	72
8	426	53.3	80
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10	610	61.0	96

A Second Problem

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

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

A Second Problem

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

- Compute TC, AC and MC when $q = 10$
 $TC = 1005$; $AC = 100.5$; $MC = 200$
- Find where $MC = AC$. $q = 0.707$
- What level of q minimizes AC? $q = 0.707$
- When is $MC = 60$? $q = 3$

A Second Problem

- The answers are based on the equations.
- You should also solve the problem using the table.

Fixed and Variable Cost

- We divide the firm's costs into fixed and variable components.

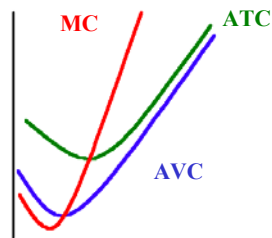
Fixed and Variable Cost

- We divide the firm's costs into fixed and variable components.
- Fixed costs, FC, are those the firm would incur if it had no output;
 $FC = C(0)$.

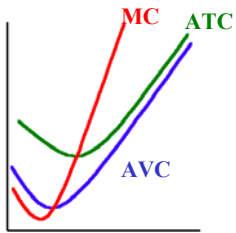
Fixed and Variable Cost

- We divide the firm's costs into fixed and variable components.
- Fixed costs, FC, are those the firm would incur if it had no output;
 $FC = C(0)$.
- Variable costs are those that vary with output. $VC = C(q) - FC$

Fixed and Variable Cost

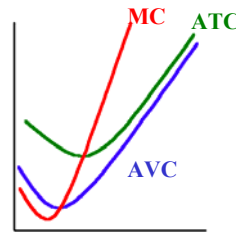


Fixed and Variable Cost



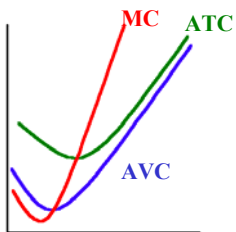
- MC cuts ATC and AVC at their minima; minimum of ATC later than min of AVC

Fixed and Variable Cost



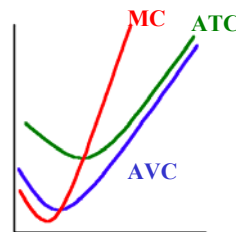
- MC cuts ATC and AVC at their minima; minimum of ATC later than min of AVC
- $AVC \neq MC$

Fixed and Variable Cost



- MC cuts ATC and AVC at their minima; minimum of ATC later than min of AVC
- $AVC \neq MC$
- $AVC < ATC$

Fixed and Variable Cost



- MC cuts ATC and AVC at their minima; minimum of ATC later than min of AVC
- $AVC \neq MC$
- $AVC < ATC$
- As $q \rightarrow \infty$, $AVC \rightarrow ATC$

One last Problem

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

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

$$FC = 10$$

$$VC = 20q + 4q^2$$

One last Problem

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

$$FC = 10$$

$$VC = 20q + 4q^2$$

$$AFC = 10/q$$

$$AVC = 20 + 4q$$

End

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