Managerial Economics in a Global Economy, 5th Edition by Dominick Salvatore

Chapter 2

Optimization Techniques and New Management Tools

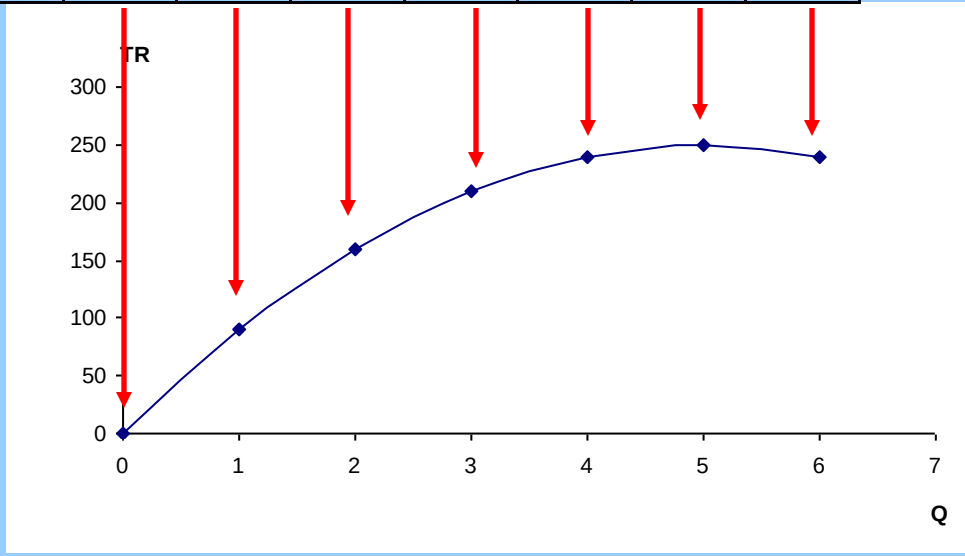
Expressing Economic Relationships

Equations: $TR = 100Q - 10Q^2$

Tables:

Q	0	1	2	3	4	5	6
TR	0	90	160	210	240	250	240

Graphs:



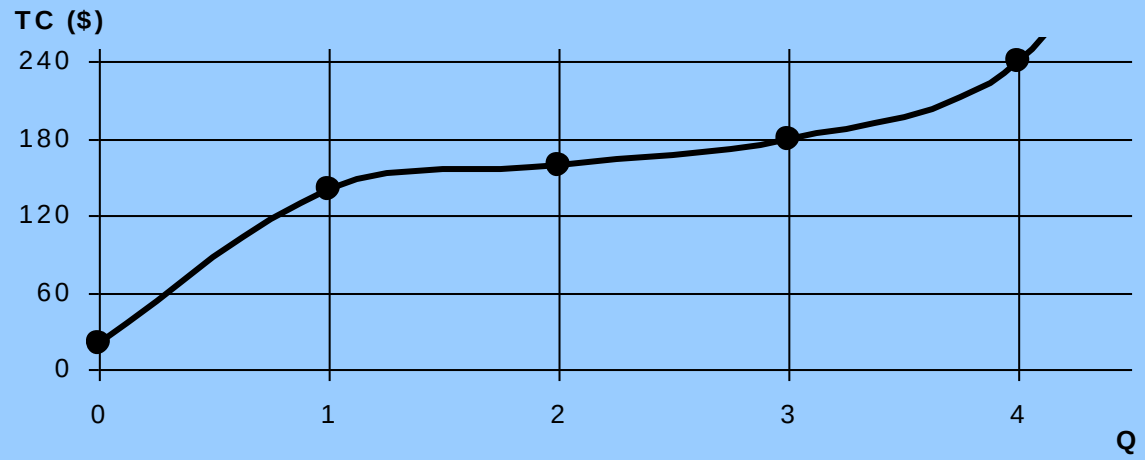
Total, Average, and Marginal Cost

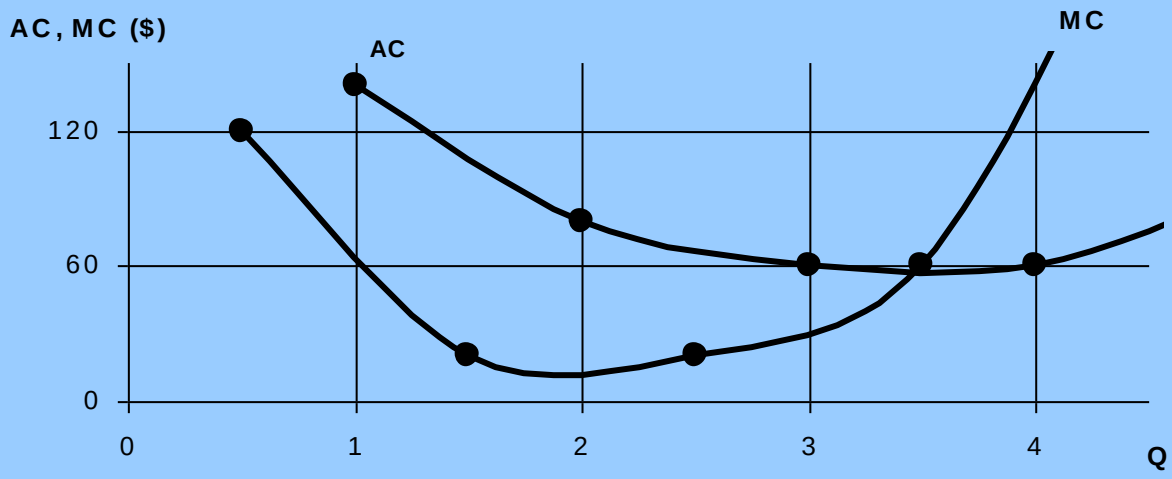
$AC = TC/Q$

$MC = \Delta TC/\Delta Q$

Q	TC	AC	MC
0	20	-	-
1	140	140	120
2	160	80	20
3	180	60	20
4	240	60	60
5	480	96	240

Total, Average, and Marginal Cost

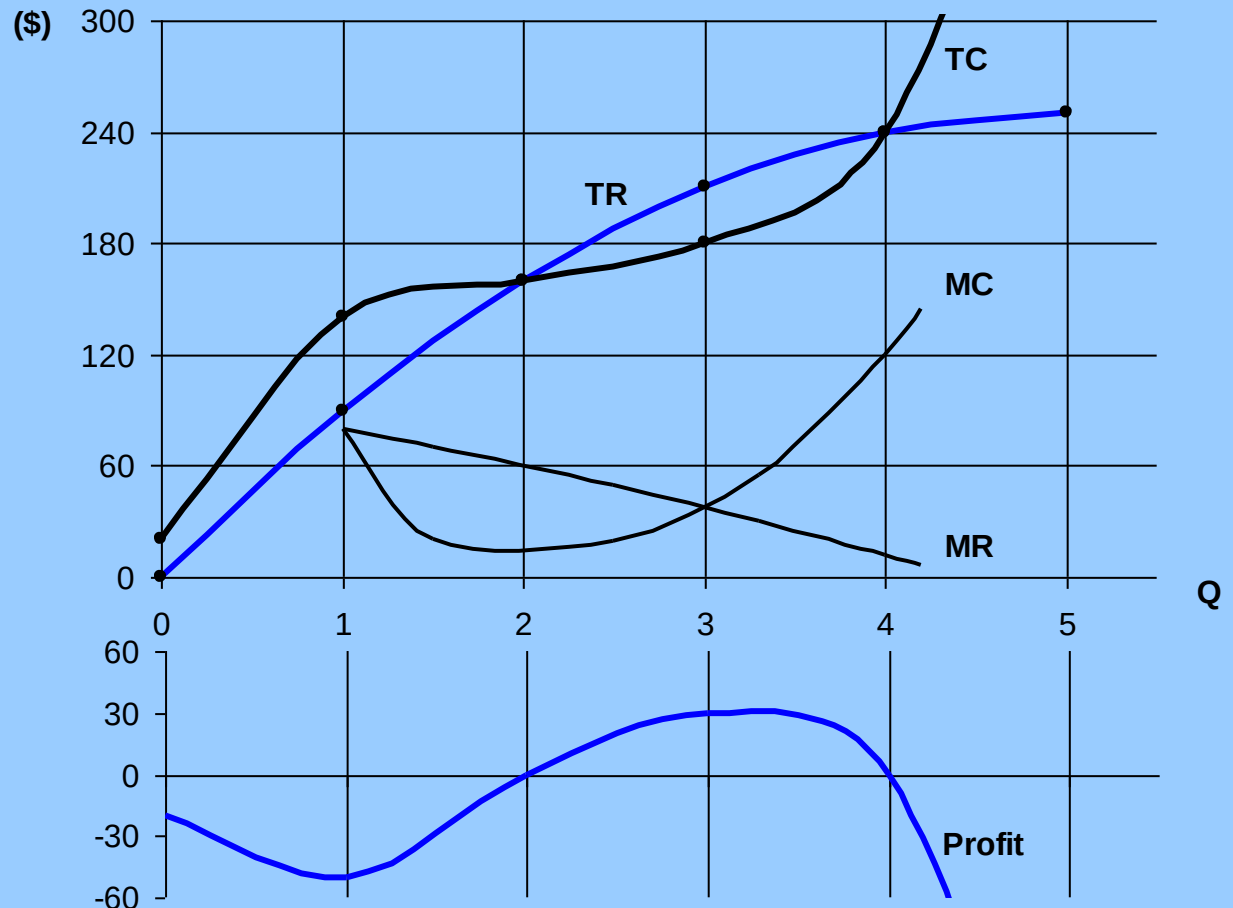




Profit Maximization

Q	TR	TC	Profit
0	0	20	-20
1	90	140	-50
2	160	160	0
3	210	180	30
4	240	240	0
5	250	480	-230

Profit Maximization



Concept of the Derivative

The derivative of Y with respect to X is equal to the limit of the ratio $\Delta Y/\Delta X$ as ΔX approaches zero.

Rules of Differentiation

Constant Function Rule: The derivative of a constant, Y = f(X) = a, is zero for all values of a (the constant).

$$Y = f(X) = a$$

$$\frac{dY}{dX} = 0$$

Rules of Differentiation

Power Function Rule: The derivative of a power function, where a and b are constants, is defined as follows.

$$Y = f(X) = aX^b$$

$$\frac{dY}{dX} = b \cdot aX^{b-1}$$

Rules of Differentiation

Sum-and-Differences Rule: The derivative of the sum or difference of two functions U and V, is defined as follows.

$$U = g(X) \qquad V = h(X) \qquad Y = U \pm V$$

$$\frac{dY}{dX} = \frac{dU}{dX} \pm \frac{dV}{dX}$$

Rules of Differentiation

Product Rule: The derivative of the product of two functions U and V, is defined as follows.

$$U = g(X) \qquad V = h(X) \qquad Y = U \cdot V$$

$$\frac{dY}{dX} = U\frac{dV}{dX} + V\frac{dU}{dX}$$

Rules of Differentiation

Quotient Rule: The derivative of the ratio of two functions U and V, is defined as follows.

$$U = g(X) \qquad V = h(X) \qquad Y = \frac{U}{V}$$

$$\frac{dY}{dX} = \frac{V \left. dU \middle/ dX \right. - U \left. dV \middle/ dX \right.}{V^2}$$

Rules of Differentiation

Chain Rule: The derivative of a function that is a function of X is defined as follows.

$$Y = f(U) \qquad U = g(X)$$

$$\frac{dY}{dX} = \frac{dY}{dU} \cdot \frac{dU}{dX}$$

Optimization With Calculus

Find X such that $dY/dX = 0$

Second derivative rules:

If $d^2Y/dX^2 > 0$, then X is a minimum.

If $d^2Y/dX^2 < 0$, then X is a maximum.

New Management Tools

- Benchmarking
- Total Quality Management
- Reengineering
- The Learning Organization

Other Management Tools

- Broadbanding
- Direct Business Model
- Networking
- Pricing Power
- Small-World Model
- Virtual Integration
- Virtual Management

