Answer on Question #38934 – Economics – Other

The demand for widgets (X) is given by:

Px = 160 – 4x

The production of widgets has the following average variable costs

AVC = 2x – 20

Fixed costs are 162.

Calculate the output level of widgets that

1: Maximizes total revenue
2: Minimizes the average total cost of widgets
3: Minimizes the total cost of widgets
4: Maximizes profits

Solution

Px = 160 – 4x, AVC = 2x – 20, FC = 162.

1 .Total revenue is maximized in the point, where TR' = 0 or MR = 0 (TR'' < 0):
TR = P*Q = (160 - 4x)*x = 160x - 4x^2
TR' = MR = 0, so
160 - 8x = 0
8x = 160
x = 20 (units)

2. The average total cost of widgets is minimized in the point, where ATC' = 0 (ATC'' < 0):
ATC = TC/Q = AVC + AFC = AVC + FC/Q = 2x - 20 + 162/x
ATC' = 0, so
2 - 162/x^2 = 0
162/x^2 = 2
x^2 = 81
x = 9 units (value -9 is disregarded because it is not positive).

3. The total cost of widgets is minimized, when TC' = MC = 0 (TC'' >0):
TC = AVC*Q + FC = 2x^2 - 20x + 162
TC' = MC = 0, so
4x - 20 = 0
4x = 20

$x = 5$ (units)

4. Profits are maximized, when MR = MC, so
$160 - 8x = 4x - 20$
$12x = 180$,
$x = 15$ (units).