Study Question -- Costs

Firm X has average cost function $AC = 500 - 5Q + Q^2$
("AC" is average cost and "Q" is units of output)

a) Derive the following cost equations for firm X:

total cost:

marginal cost:

b) At what level of Q are total costs minimized? Demonstrate with at least one calculation.

c) Does this firm's production exhibit economies of scale throughout its entire range of possible levels of production? Explain, and demonstrate with at least one calculation.

Firm X has average cost function $AC = 500 – 5Q + Q^2$
("AC" is average cost and "Q" is units of output)

a) Derive the following cost equations for firm X:

total cost:

marginal cost:

$TC = AC \times Q = 500Q – 5Q^2 + Q^3$

$MC = dTC/dQ = 500 – 10Q + 3Q^2$

b) At what level of Q are total cost minimized? Demonstrate with at least one calculation.

At Q = 0, total cost is minimized at TC = 0

c) Does this firm's production exhibit economies of scale throughout its entire range of possible levels of production? Explain, and demonstrate with at least one calculation.

No. Beyond some point average costs rise; this is inconsistent with economies of scale. Observe this spreadsheet calculation, which shows Q and AC:

0	500
1	496
2	494
3	494
4	496
5	500