



B.E. International Program
Faculty of Economics, Thammasat University



EE 320 Introductory Mathematical Economics (Section 046402)

Semester 1/2013

Practice Problem 5 (Differential Calculus)

Suggested Answers

1. Q.2 (a) $4x^{-5}$ (b) $3x^{-2/3}$ (c) $20w^3$
(d) $2cx$ (e) abu^{b-1} (f) abu^{-b-1}

- Q.3 (a) $f'(x) = 18; f'(1)=f'(2)=18.$
(c) $f'(x) = 10x^{-3}; f'(1)=10; f'(2) = 1/4$
(d) $f(x) = x^{1/3}; f'(1) = 1; f'(2) = 2^{1/3}$

2. Q.1 $VC = Q^3 - 5Q^2 + 12Q; \quad \frac{dVC}{dQ} = MC = 3Q^2 - 10Q + 12$

Q.2 $C = AC \cdot Q = Q^3 - 4Q^2 + 174Q; \quad \frac{dC}{dQ} = MC = 3Q^2 - 8Q + 174$

This is a long-run cost function because the fixed cost is zero.

Q.4 (b) $R = AR \cdot Q = 60Q - 3Q^2; \quad MR = \frac{dR}{dQ} = 60 - 6Q$

(c) Yes.

(d) The MR curve is twice as steep as the AR curve.

Q.7 (a) $\frac{(x^2-3)}{x^2}$ (b) $-\frac{9}{x^2}$

(c) $\frac{30}{(x+5)^2}$ (d) $\frac{acx^2+2adx-bc}{(cx+d)^2}$

Q.10 (a) $MC = 6Q + 7$; $AC = 3Q + 7 + \frac{12}{Q}$

(b) $MR = 10 - 2Q$ $AR = 10 - Q$

(c) $MP = a + 2bL - cL^2$ $AP = a + bL - cL^2$

3. Q.1 $\frac{dy}{dx} = -2x[3(5 - x^2)^2 + 2]$

Q.3 (a) $\frac{dy}{dx} = 18x(3x^2 - 13)^2$

(b) $\frac{dy}{dx} = 189x^2(7x^3 - 5)^8$

(c) $\frac{dy}{dx} = 5a(ax + b)^4$

Q.4 Both methods yield the same answer $\frac{dy}{dx} = -32(16x + 3)^{-3}$

4. (a) $MC = 6Q + 7$; $AC = 3Q + 7 + \frac{12}{Q}$.

(b) $\frac{d\pi}{dQ} = 2Q - 13$; $\frac{\pi}{Q} = Q - 13 + \frac{78}{Q}$

5. $MPC = 0.8$