MATH 172 PROBSET 2

1-A) A manufacturer's marginal-revenue function is $\frac{dr}{dq} = 275 - q - 0.3q^2$

If r is in YTL, find the increase in the manufacturer's total revenue if production is increased from 10 to 20 units.

B) Evaluate the definite integrals,

$a)\int_0^5 (x+x^2)dx, \quad b)\int_2^{10}\frac{dx}{x-1}, \quad c)\int_0^1 \frac{x^2+x+\sqrt{x+1}}{x+1}dx, \quad d)\int_0^2 x^2 e^{x^3}dx, \quad e)\int_{\sqrt{3}}^2 7x\sqrt{4-x^2}\,dx$

C) If $\int_1^5 f(x)dx = 6$ *and* $\int_5^3 f(x)dx = 2$ *find* $\int_1^3 f(x)dx$

2) Find the area of the region bounded by the curve, lines and x-axis. Sketch the region on the x-y plane.

a) $y = x^2 - 1,\ x = 0,\ x = 2$

b) $y = x^2 - 1,\ y = 0$

c) $y = x^2 + 2x - 3,\ x = -1,\ x = 2$

d) Evaluate $\int_{-1}^2 (x^2 + 2x - 3)dx$ and compare the results with the results of c

e) $y = \frac{1}{x-2},\ x = 3,\ x = e^2 + 2$

f) $y = e^x,\ x = -1,\ x = 1$

g) $y = \frac{1}{2}(e^x + e^{-x}),\ x = -1,\ x = 1$

3) Find the area of the region bounded by the given curves and lines. Sketch the region on the x-y plane.

a) $y = x^2,\ y = -x^2 + 2$

b) $y = x^2,\ y = x$

c) $y = x^2,\ y = x,\ x = 3$

d) $y = -3x^2 + 3,\ y = 3x + 3$

e) $y = -3x^2 + 3,\ y = 3x + 3,\ y = 1$

4) Express the area of the region bounded by the given curves and lines in terms of definite integral or integrals.

a) $y = (x-1)^2,\ y = x + 5$

b) $y = x^2 + 2x - 1,\ y = 2$

5) Profit of a company is a function of units sold (q) and is given by the following function:

$f(q) = 4 - q - \frac{1}{q}$, q changes between 10 and 30. Evaluate the average profit per unit using the integral;

$$I = \frac{1}{20}\int_{10}^{30} f(q)dq$$

answer: $-16 - \frac{\ln 3}{20}$

6) Demand and supply equations are given respectively. Determine consumer and producer surpleses under market equilibrium.

a) $p = 100 - q^2,\ p = 2q + 20$

b) $p = 1500 - q^2,\ p = 700 + q^2$

7) Marginal cost function of a product is given; a) Determine the marginal cost when 90 units are produced, b) If fixed cost is \$500, find the total cost of producing 90 units.

$$\frac{dc}{dq} = 10 - \frac{100}{q+10}$$

8) The demand equation for a product is $p = 0.01q^2 - 1.1q + 30$ and the supply equation is $p = 0.01q^2 + 8$. Determine consumers' surplus and producers' surplus when market equilibrium has been established.