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YEAR 12

IARTV TEST — OCTOBER 2001

MATHEMATICAL METHODS — EXAMINATION 2 (ANALYSIS TASK)

ANSWERS & SOLUTIONS

IARTV EXAMINATION 2 (ANALYSIS TASK)

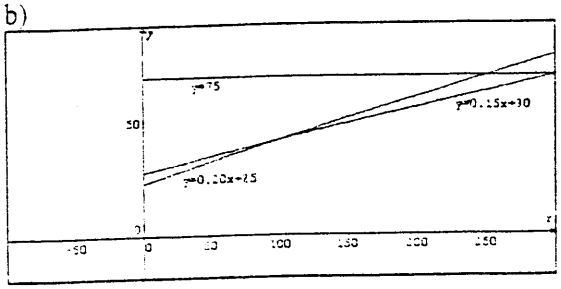
Question 1

$C_A = 30 + 0.15x, \quad x \geq 0$

a) $C_B = 25 + 0.20x, \quad x \geq 0$

$C_C = 75, \quad x \geq 0$

b)



$C_A = \$52.50$

c) $C_B = \$55$

$C_C = \$75$

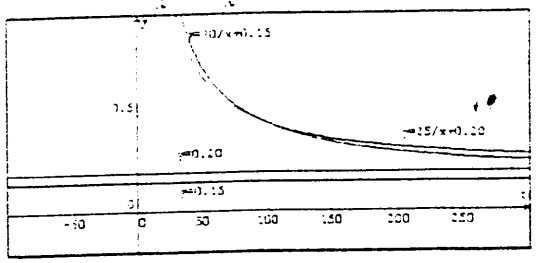
d) 100km

e) When the truck travels more than 300km.

$Average_A = \frac{C_A}{x} = \frac{30}{x} + 0.15$

f)

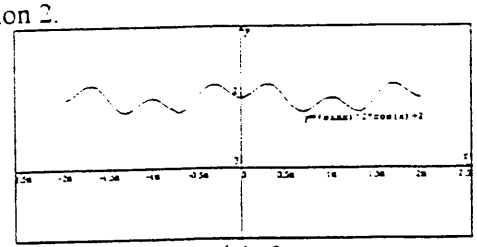
$Average_B = \frac{C_B}{x} = \frac{25}{x} + 0.20$



g)

h) Bravo is cheapest up to 100km.
Ajet is cheapest for distances greater than 100km.

Question 2.



a)

b) Y1=(sin(x))^2cos(x)+2

c) (0.955,2.385) and (2.187,1.615)

d) gradient = -1

e) period = 2π*100, amp = 0.385*100

f) $\frac{dy}{dx} = 2\sin x\cos^2 x - \sin^3 x$

g) $x = 0, \pi, 2\pi, 0.956, 5.328, 2.186, 4.097$

h) $y_1 = \frac{1}{4}y_2$, dilation parallel y-axis sf 4

Question 2 continued

i) $Area = 2 * \frac{\pi}{2} - \int_{\frac{\pi}{2}}^{\pi} y dx = \pi - 2.80826$

$Area = \frac{10000}{3} m^3$

$Volume = \frac{1}{3} * 100000 * 1000 = 0.333 * 10^7$

Question 3.

a) B = 60 000

b) V = 110 000

c) V = 68 072

d) t = 6.21 (6 weeks)

e) $\frac{dV}{dt} = -0.4 * 60000e^{-0.4t} < 0$

for all t.

f) Sales are decreasing by $7229 per week

g) $\int_0^5 50000 - 60000e^{-0.4t} dt$

h) V = 3899 628

i) 3899 628 – 50 000*15
= 3149 628

$V = A - Be^{-0.4t}$

j) $V = A - B(e^{-0.4})^t$

$V = A - B(0.6703)^t$

Question 4.

a) $\frac{^{450}C_{45}\ ^{40}C_5}{^{500}C_{50}} = 0.171$

b) $^{500}C_{460}\,0.92^{460}0.08^{40} = 0.0656$

c) 0.92*0.05 = 0.046

d) i) 0.034

ii) 0.034/0.08 = 0.425

e) 500* 0.92 = 460

f) 460*0.08 = 36.8

g) 0.050

h) 0.901

i) 500 needs to be 2.3263 standard deviations above the mean
So the mean is 486 and this means n = 528.