Name: KEY | ID: KEY | Sec: 8 (9:00-9:50) 9 (10:00-10:50)

MATH-102 Term-152 CQ3 Form A

(show all your work and circle one letter to get a full mark or you will get zero)

1) $\int_0^1 \frac{5(1+\sqrt{x})^4}{\sqrt{x}}\,dx = I$

let $u = 1+\sqrt{x} \Rightarrow du = \frac{1}{2\sqrt{x}}\,dx$

$I = 2\int_0^1 \frac{5(1+\sqrt{x})^4}{2\sqrt{x}}\,dx = 2\int_1^2 5u^4\,du$

$= 10\int_1^2 u^4\,du = 10\left[\frac{u^5}{5}\right]_1^2 = 2\left[u^5\right]_1^2$

$= 2\left[2^5 - 1^5\right] = 2\left[32-1\right] = 2\times 31 = 62$

(a) 40

(b) 220

(c) 62

(d) 422

(e) None of the above

2) The area of the region lying between the curves $y = x^3$ and $y = 9x$ is equal to

(a) $\int_{-3}^{0}(9x - x^3)dx + \int_0^3 (x^3 - 9x)dx$

(b) $2\int_0^3 (9x - x^3)dx$

(c) $\int_{-3}^{3}(x^3 - 9x)dx$

(d) $\int_{-3}^{3}(x^3 - 9x)dx - \int_0^3 (9x - x^3)dx$

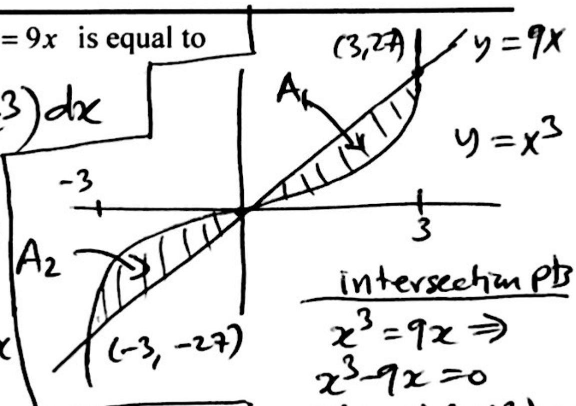
(e) $\int_{-3}^{0}(x^3 - 9x)dx + \int_0^3 (9x - x^3)dx$

(f) none of the above

$A_1 = \int_0^3 (9x - x^3)dx$

$A_2 = \int_{-3}^{0} (x^3 - 9x)dx$

$= -\int_{-3}^{0} (9x - x^3)dx$



intersection pts
$x^3 = 9x \Rightarrow$
$x^3 - 9x = 0$
$x(x-3)(x+3) = 0$

But $g(x) = 9x - x^3$ is an odd

$A_2 = \int_0^3 (9x - x^3)\,dx$

Hence Area $= 2\int_0^3 (9x - x^3)dx$

3) Let f be an even and continuous function. If $\int_0^8 f(u)du = 4$ then $\underbrace{\int_{-2}^{2} 3x^2 f(x^3)dx}_{I_1} + \underbrace{\int_{-2}^{2} 3x^5 f(x^3)dx}_{I_2} =$

(a) 16

(b) 12

(c) 8

(d) 4

(e) 1

(f) none of the above

let $u = x^3 \Rightarrow du = 3x^2 dx$

$I_1 = \int_{-8}^{8} f(u)\,du = 2\int_0^8 f(u)\,du = 8$ (f even)

$I_2 = \int_{-2}^{2} 3x^2 \cdot x^3 f(x^3)dx = \int_{-8}^{8} u f(u)\,du$ ($u f(u)$ odd)

$= 0$

Hence $I_1 + I_2 = 8$

$\boxed{\text{FORM B: (1) 422 (2) (b)(e) (3) 16}}$