Name:	**ID:**	**Sec:** 34(11:00-11:50) 23(1:10-2:00)

MATH-102 Term-132 **Class-QUIZ-3**

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

1) The area of the region lying between the curves $y = x^3$ and $y = 4x$ is equal to

(a) $\int_{-2}^{0}(4x - x^3)dx + \int_{0}^{2}(x^3 - 4x)dx$

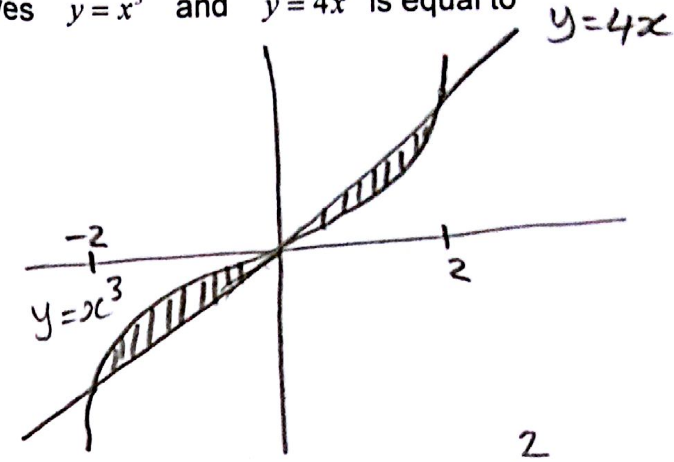
(b) $-2\int_{0}^{2}(4x - x^3)dx$

(c) $\int_{-2}^{2}(x^3 - 4x)dx$

(d) $\int_{-2}^{2}(x^3 - 4x)dx - \int_{0}^{2}(4x - x^3)dx$

(e) $\int_{-2}^{0}(x^3 - 4x)dx + \int_{0}^{2}(4x - x^3)dx$

(f) none of the above



intersection points

$x^3 = 4x \Rightarrow x^3 - 4x = 0$

$\rightarrow x(x^2-4) = 0 \Rightarrow$

$x = -2, 0, 2$

Area $= \int_{-2}^{0}(x^3-4x)dx + \int_{0}^{2}(4x-x^3)dx$

2) $\int_{0}^{\sqrt{e-1}} \frac{2t}{t^2+1}\ln(t^2+1)dt = I$

(a) $\frac{3}{2}$

(b) $\frac{1}{2}$

(c) $\frac{e}{2}$

(d) $\frac{3e}{4}$

(e) $\frac{1}{2}(e-1)$

(f) none of the above

Let $u = \ln(t^2+1) \rightarrow du = \frac{2t}{t^2+1}dt$

$\Rightarrow \int \frac{2t}{t^2+1}\ln(t^2+1)dt = \int u\,du$

$= \frac{1}{2}u^2 + c = \frac{1}{2}\left[\ln(t^2+1)\right]^2 + c$

Now, $I = \left[\frac{1}{2}\left[\ln(t^2+1)\right]^2\right]_0^{\sqrt{e-1}}$

$= \frac{1}{2}\left[\ln(e-1+1)\right]^2 - \frac{1}{2}\left[\ln(1)\right]^2$

$= \frac{1}{2} - 0 = \frac{1}{2}$

3) The area of the region enclosed by the curves $y=4-x^2$, $y=2x-4$ and $y=4$ is equal to

(a) $\int_0^4 \left((4x-x^2)-(2x-4)\right)dx$

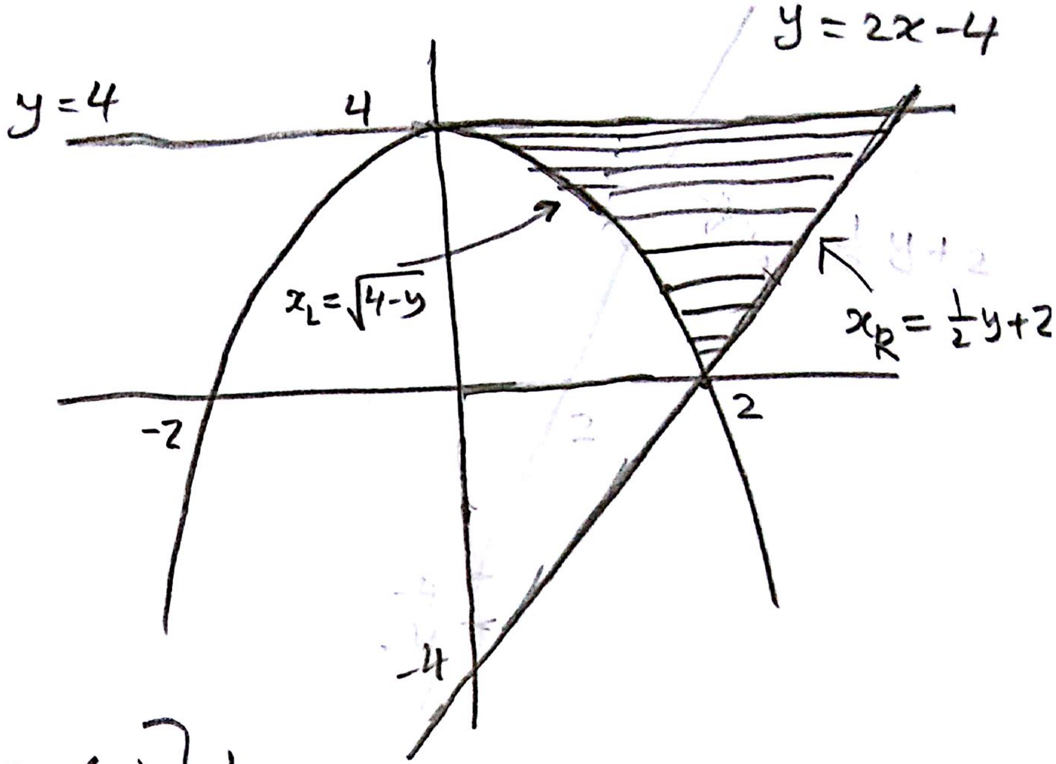
(b) $\int_2^4 \left((\frac{1}{2}y+2)-(\sqrt{4-y})\right)dy$

(c) $\int_0^4 \left((\frac{1}{2}y+2)-(-\sqrt{4-y})\right)dy$

(d) $\int_0^4 \left((\frac{1}{2}y+2)-(\sqrt{4-y})\right)dy$

(e) $\int_0^2 \left((2x-4)-(4-x^2)\right)dx$

(f) none of the above



$$\text{Area} = \int_{y=0}^{y=4} \left[x_R(y) - x_L(y)\right] dy$$

$$= \int_0^4 \left[\left(\tfrac{1}{2}y+2\right) - \left(\sqrt{4-y}\right)\right] dy$$