Name: KEY | ID: KEY | Sec: 10

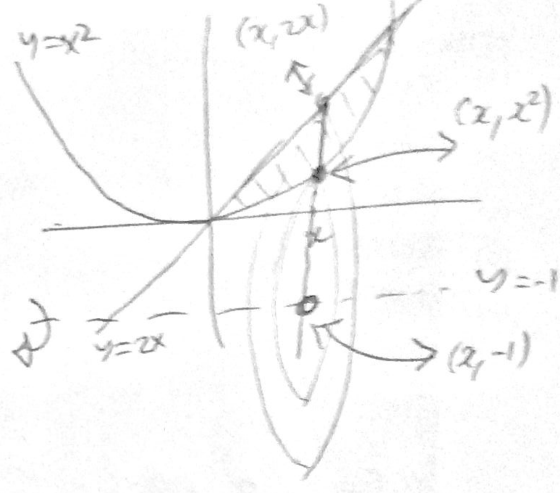
MATH-102 Term-142 CQ-5

(circle one letter and show all your work)

1)The volume of the solid generated by revolving the region bounded by the curves $y = 2x$, $y = x^2$ about the line $y = -1$ is

$r_{out} = 2x+1$

$r_{in} = x^2+1$



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

(b) $\int_0^1 \pi(4x^2 - x^4)dx$

(c) $\int_0^2 2\pi((2x+1)x^2)dx$

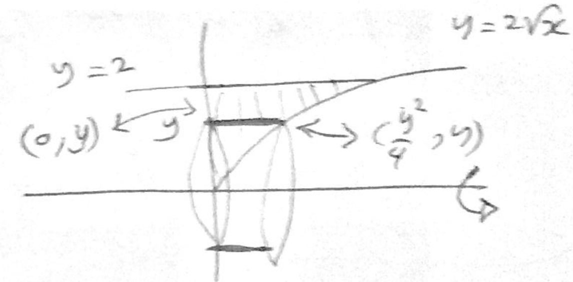
(d) $\int_0^1 \pi(2x+1)^2 - (x^2+1)^2)dx$

(e) $\int_0^2 \pi(2x+1)^2 - (x^2+1)^2)dx$

(f) None of the above

2)The volume of the solid generated by revolving the region bounded by the curves $y = 2\sqrt{x}$ and the lines $y = 2$, and $x = 0$ about the x-axis is

use shell



(a) $2\pi/5$

(b) $7\pi/5$

(c) π

(d) 2π

(e) $\pi/5$

(f) None of the above

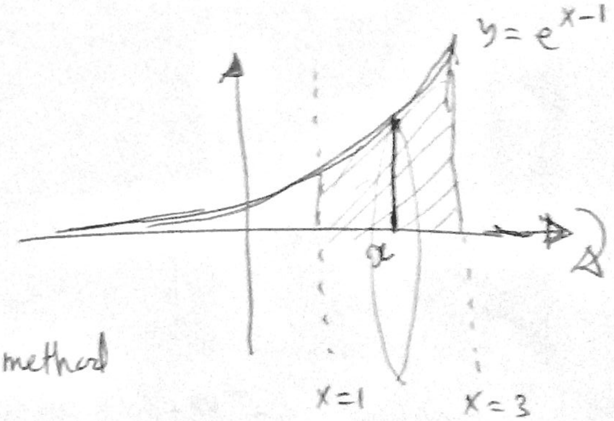
$r = y$

$h = y^2/4$

$$V = \int_0^2 2\pi y\,(y^2/4)\,dy$$

$$= \frac{\pi}{2}\int_0^2 y^3 dy = \frac{\pi}{2}\left[\frac{1}{4}y^4\right]_0^2 = \frac{\pi}{2}[4] = 2\pi$$

3)The volume of the solid generated by revolving the region bounded by the curves $y = e^{x-1}$, $y = 0$, x=1 and $x = 3$ about the x-axis is



(a) $\pi(e^4 + 2)/2$

(b) $\pi(e^4 - 1)/2$

(c) $\pi(e^2 - 2)/2$

(d) $\pi(e^4 - 3)/2$

(e) $\pi(e^6 - e^2)$

(f) None of the above

if you use shell you have to divid the region.
we will use disk method

$r = e^{x-1}$

$$V = \int_1^3 \pi r^2 dx = \int_1^3 \pi e^{2x-2} dx = \frac{\pi}{e^2}\int_1^3 e^{2x} dx$$

$$= \frac{\pi}{e^2}\left[\frac{1}{2}e^{2x}\right]_1^3 = \frac{\pi}{2e^2}\left[e^6 - e^2\right] = \frac{\pi}{2}\left[e^4 - 1\right]$$

4)The base of a solid is a triangular region bounded by the lines y=x , y=1 , and x=0. If the cross-sections of the solid perpendicular to the y-axis are semi-circles with diameters running across the base of the solid , then the volume of the solid is

(a) $\pi/36$

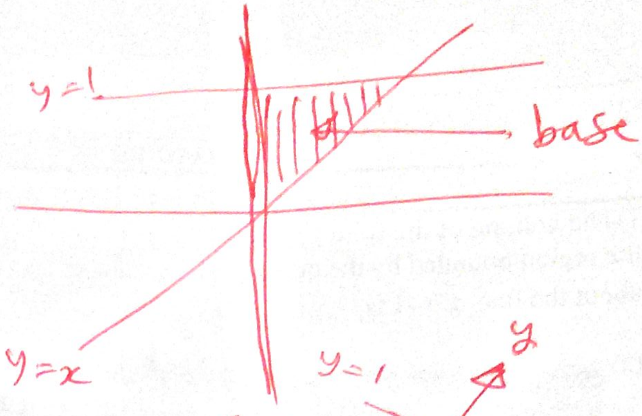
(b) $3\pi/8$

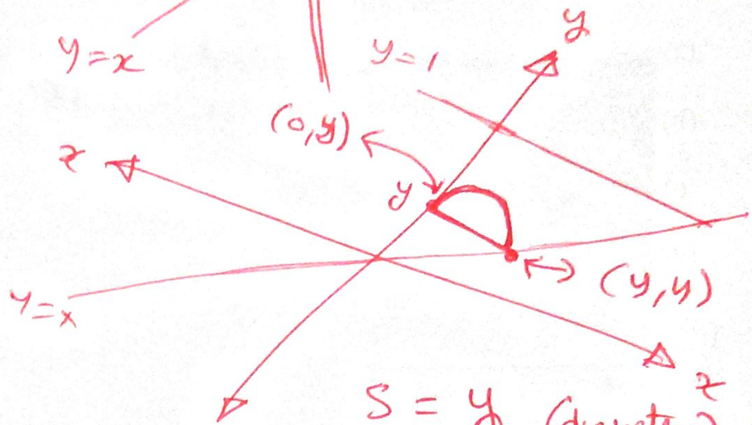
(c) $\pi/16$

(d) $\pi/24$

(e) $\pi/4$

(f) None of the above





$$V = \int_0^1 A(y)\,dy = \int_0^1 \frac{\pi}{8} y^2\,dy$$
$$= \frac{\pi}{8}\left[\frac{1}{3}y^3\right]_0^1 = \frac{\pi}{24}$$

$S = y$ (diameter)

$r = \frac{1}{2}y$

$A =$ half circle $= \frac{1}{2}\pi r^2 = \frac{\pi}{8}y^2$

5)The region in the first quadrant enclosed by the parabolas $y = 2 - x^2$, $y = x^2$ and the y-axis is rotating about the line $x = -1$, then the volume of the solid generated is given by

(a) $\int_0^1 4\pi(1 + x - x^2 - x^3)dx$

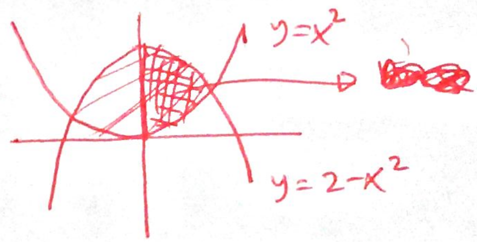
(b) $\int_0^2 2\pi(1 + x - x^2 - x^3)dx$

(c) $\int_0^1 4\pi(1 - 2x - 2x^2 + x^3)dx$

(d) $\int_0^2 2\pi(1 - x - x^2 - x^3)dx$

(e) $\int_0^1 2\pi(4 - x^2 + 2x^4)dx$

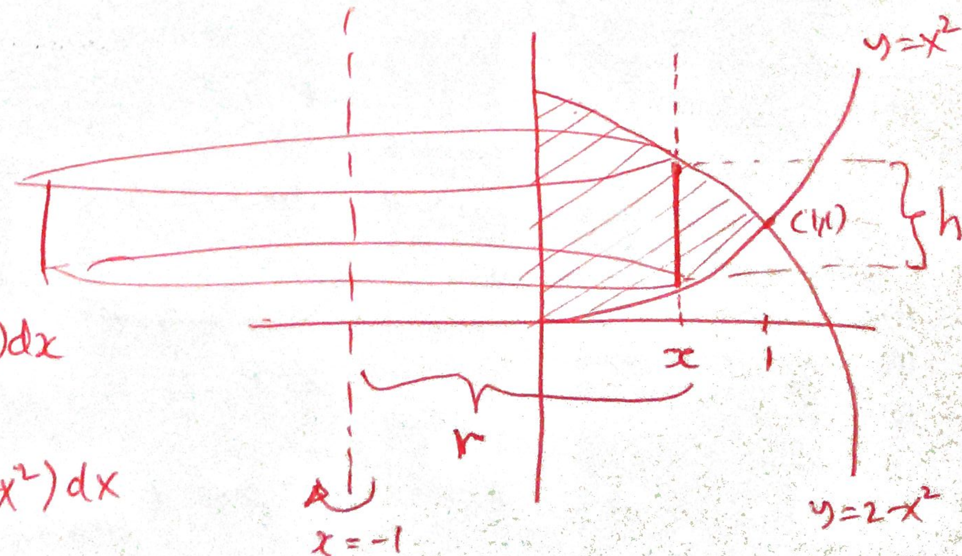
(f) None of the above



intersect pts: $x^2 = 2 - x^2 \Rightarrow 2x^2 - 2 = 0$

$2(x^2 - 1) = 0 \Rightarrow x = \pm 1$

$$V = \int_0^1 2\pi r h\,dx$$
$$= \int_0^1 2\pi(1+x)(2-2x^2)\,dx$$
$$= \int_0^1 4\pi(1+x)(1-x^2)\,dx$$
$$= \int_0^1 4\pi(1 + x - x^2 - x^3)\,dx$$



$r = 1 + x$

$h = (2 - x^2) - x^2 = 2 - 2x^2$