Math 102

Quiz#2

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Name:

ID No.:

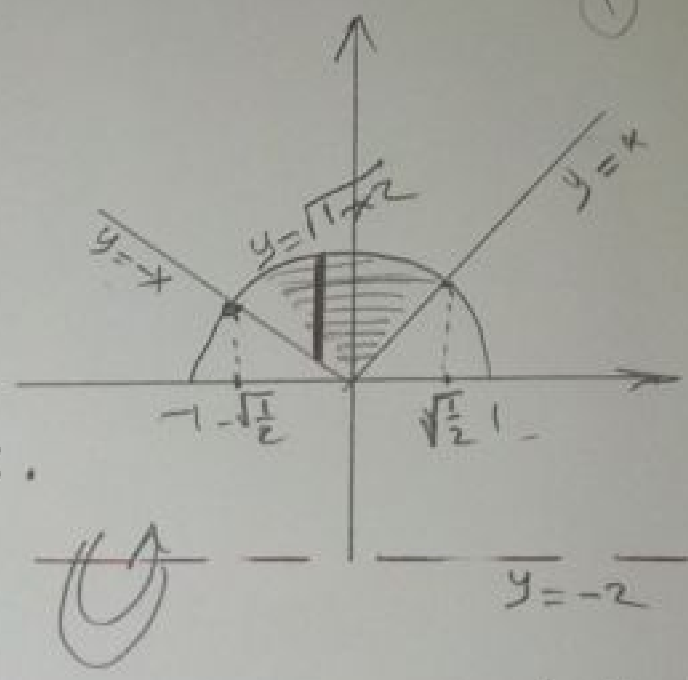
Serial No.:

1. **Find the volume of the solid enclosed by the graph of** $y=\sqrt{1-x^2}$ and $y=|x|$, and is revolved about the axis $y=-2$. (Just set up the integral formula)

By washers Method:

$$V=\int_{-\frac{1}{\sqrt{2}}}^{0}\pi\left[\left(\sqrt{1-x^2}+2\right)^2-\left(-x+2\right)^2\right]dx$$

$$+\int_{0}^{\frac{1}{\sqrt{2}}}\pi\left[\left(\sqrt{1-x^2}+2\right)^2-\left(x+2\right)^2\right]dx.$$



By cylinderical shells method:

(Not trivial).

$x=\sqrt{1-x^2}$

$2x^2=1$

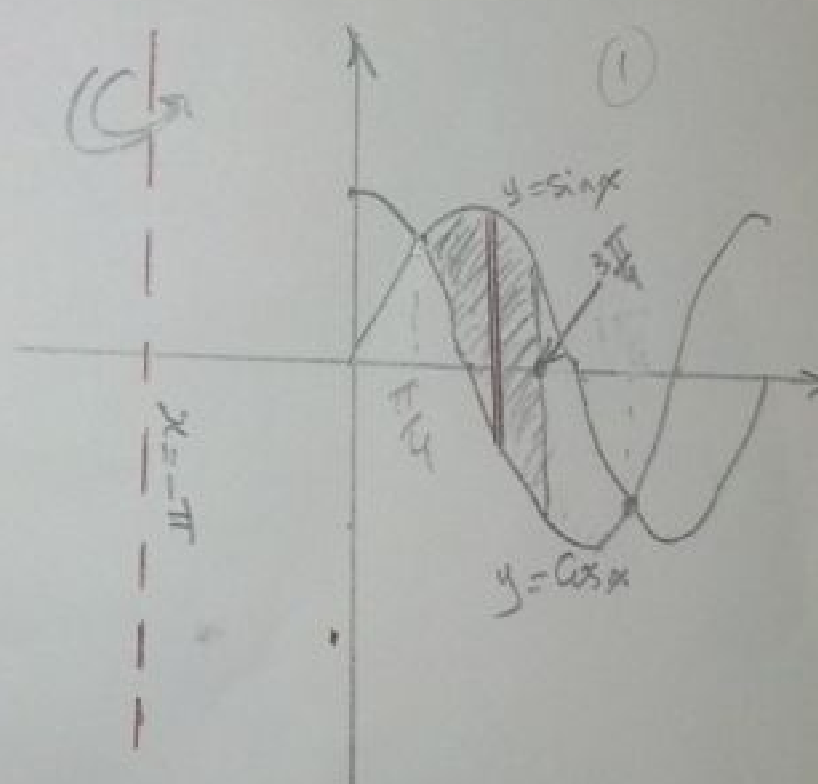
$x=\pm\sqrt{\frac{1}{2}}$

2. **Find the volume of the solid enclosed by the graph of** $y=\sin x$ and $y=\cos x$, from $x=\frac{\pi}{4}$, to $x=\frac{3\pi}{4}$ and is revolved about the axis $x=-\pi$.

By Cylinerical Shells Method:

$$V=\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}}2\pi\left(x-(-\pi)\right)\left(\sin x-\cos x\right)dx$$

$$=\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}}2\pi\,(x+\pi)\left(\sin x-\cos x\right)dx.$$



Math 102

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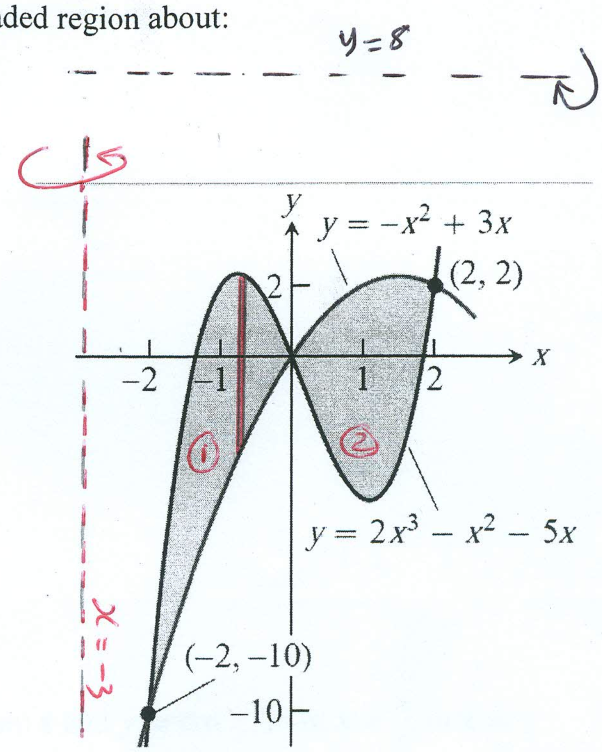
1. Find the volume of the solid generated by revolving the shaded region about:
   a. The line $x = -3$
   b. The line $y = 8$.



(a) By Cylinderical Shell's:

- $R = x - (-3) = x + 3$
- $H_1 = (2x^3 - x^2 - 5x) - (-x^2 + 3x)$
- $H_2 = (-x^2 + 3x) - (2x^3 - x^2 - 5x)$

$$V = \int_{-2}^{0} 2\pi R \cdot H_1 \, dx + \int_{0}^{2} 2\pi R \, H_2 \, dx .$$

(b) By Washers:

$$\begin{cases} R_{outer1} = 8 - (-x^2 + 3x) . \\ R_{inner1} = 8 - (2x^3 - x^2 - 5x) . \end{cases}$$

$$\begin{cases} R_{outer2} = 8 - (2x^3 - x^2 - 5x) . \\ R_{inner2} = 8 - (-x^2 + 3x) . \end{cases}$$

$$V = \int_{-2}^{0} \pi \left[(R_{outer1})^2 - (R_{inner1})^2 \right] dx + \int_{0}^{2} \pi \left[(R_{outer2})^2 - (R_{inner2})^2 \right] dx .$$