Mathematics Department

MATH 141 - Worksheet #6

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• Name: - - - - - - -

Q1. Find the volume of the solid generated by revolving the region bounded by $y=\sqrt{x}$, $y=2$, $x=0$ about

a. x-axis (Shell Method)

b. y-axis (Disk Method)

c. $x=4$ (Shell Method) & (Washer Method)

d. $y=2$ (Disk Method)

Q2. Find the volume of the solid generated by revolving the region bounded by $y=\frac{1}{x}$, $y=\frac{1}{2}$, $x=1$, $x=2$ (Don't Evaluate Integrals)

1. About x-axis using Washer Method

2. About x-axis using Shell Method

3. About the line $x=2$ using Washer Method

4. About the line $x=2$ using Shell Method

5 About the line $x=1$ using Disk Method.

Short Answers:

Q_1 ⓐ. $V = \int_0^2 2\pi (y)(y^2)\, dy = 8\pi$

ⓑ $V = \int_0^2 \pi (y^2)^2\, dy = \frac{32}{5}\pi$

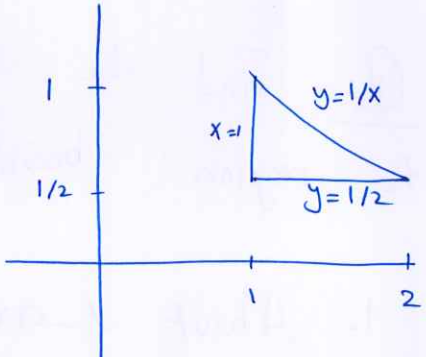
ⓒ Shell Method $V = 2\pi \int_0^4 (4-x)(2-\sqrt{x})\, dx = \frac{224\pi}{15}$

Washer Method $V = \pi \int_0^2 \left[4^2 - (4-y^2)^2\right] dy = \frac{224\pi}{15}$

ⓓ $V = \pi \int_0^4 (2-\sqrt{x})^2\, dx = \frac{8\pi}{3}$

Q_2. ① $V = \pi \int_1^2 \left[\left(\frac{1}{x}\right)^2 - \left(\frac{1}{2}\right)^2\right] dx$

② $V = 2\pi \int_{1/2}^1 (y)\left(\frac{1}{y} - 1\right) dy$



③ $V = \pi \int_{1/2}^1 \left[(1)^2 - \left(2-\frac{1}{y}\right)^2\right] dy$

④ $V = 2\pi \int_1^2 (2-x)\left(\frac{1}{x} - \frac{1}{2}\right) dx$

⑤ $V = \pi \int_{1/2}^1 \left(\frac{1}{y} - 1\right)^2 dy$