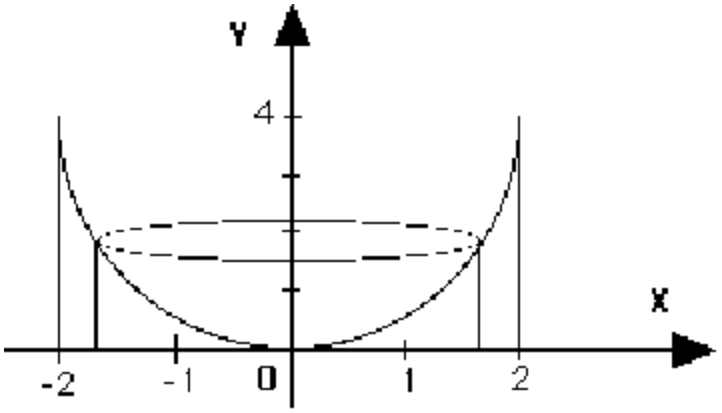
CALCULUS I – Worksheet #36

Read p.387–391 in your book.

Please look at the NOTES on SHELLS in your notebooks!

Shell Method: $V = 2p\int_a^b (\text{radius})(\text{height})\,dx$ or $2\pi\int_a^b (\text{radius})(\text{height})\,dy$

Example: $y = x^2$, $y = 0$, $x = 0$, and $x = 2$ around the y–axis



$$V = 2\pi\int_0^2 x\left(x^2\right)dx = 2\pi\int_0^2\left(x^3\right)dx = 2\pi\left.\frac{1}{4}x^4\right]_0^2 = \frac{p}{2}(16-0) = 8\pi$$

For problems 1–2, find the volumes of the following using the method of cylindrical shells.

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1. $y = 5x^2$, $y = 0$, $x = 2$ y–axis

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2. $y = x^4$, $y = 0$, $x = 1$ y–axis

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3. The slope of the line tangent to the curve $2x^3 - x^2y^2 + 4y^3 = 16$ at the point (2,1) is

   A) –7 B) –5 C) –1 D) 5 E) 7

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4. The approximate value of $\int_0^3 (1 + 2^x)dx$, found by using three inscribed or left–endpoint rectangles of equal width, is A) 7 ln 2 B) 10 ln 2 C) 7 D) 10 E) 17

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5. $\int_{p/6}^{p/3} \frac{\sin x}{\cos x}\,dx =$ A) $\frac{1}{2}$ ln 2 B) $\frac{1}{2}$ ln 3 C) ln 2 D) $\frac{e}{2}$ E) e

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