Calculus Worksheet #4 Unit 11 Selected Solutions

Known Cross Section

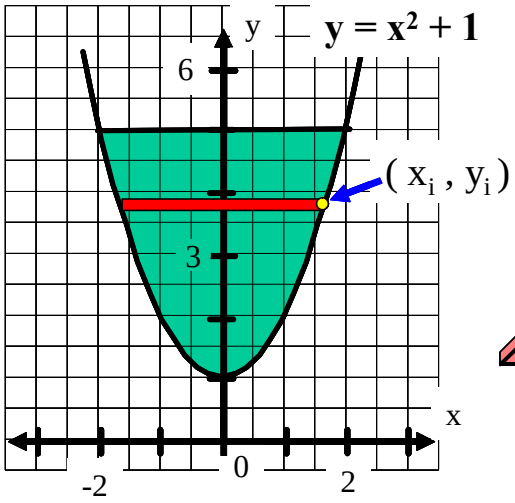
In each problem a solid is described. You must

a) sketch the base of the solid, showing a typical cross sectional slice,
b) write an expression for the volume of this cross sectional slice,
c) express the exact volume of the solid as a definite integral, and
d) evaluate the integral.

Show all of your work neatly organized on graph paper.

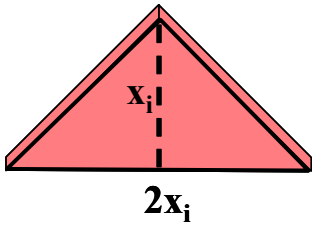
4. The base of a solid is the region bounded by the curve $y = x^2 + 1$ and the line $y = 5$. Each cross section by a plane perpendicular to the y-axis is an isosceles right triangle with its hypotenuse in the base of the solid.

a.



$A_c = x_i^2 = y_i$ ï 1

thickness = Δy



$V = A_c$ (thickness)

b. $V_i = (y_i - 1)\Delta y$

c. $V = \int_1^5 (y - 1)\, dy$

d. V = 8 cu. units