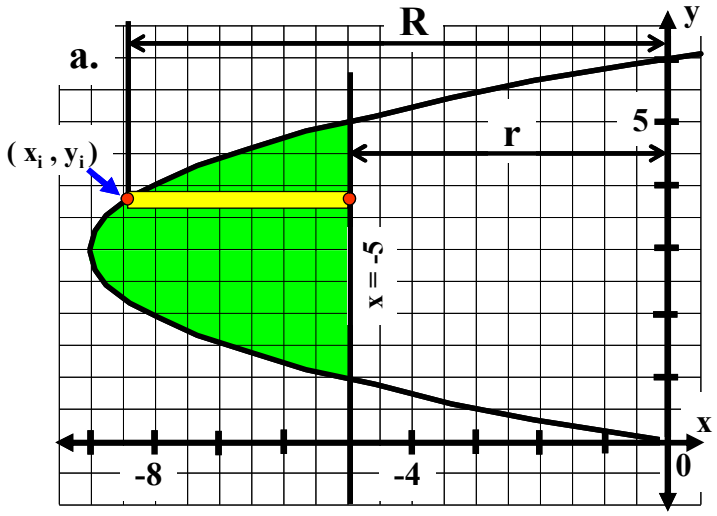
Calculus Worksheet #2 Unit 11 Selected Solutions

Use ñwashersò to find the volume generated by rotating the given region about the given line. For each problem, you must

a) sketch the generating region, showing a typical generating rectangle,
b) write an expression for the volume generated by this rectangle,
c) express the exact volume of the solid as a definite integral, and
d) evaluate the integral.

2. The region between $x = y^2 - 6y$ and $x = -5$ is rotated about the y-axis.



Washers: $V = \pi(R^2 - r^2)h$

$R = -x_i = 6y - y_i^2$

$r = 5$

$h = \Delta y$

b. $V_i = \pi((6y - y_i^2)^2 - 5^2)\,\Delta y$

c. $V = \pi\int_1^5 ((6y - y^2)^2 - 25)\,dy$

$V = \pi\int_1^5 (y^4 - 12y^3 + 36y^2 - 25)\,dy$

d. $V \approx 442$ cu. units