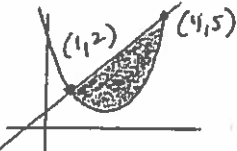


# SOLIDS OF KNOWN CROSS SECTION

Key  
NAME \_\_\_\_\_

## AP CALCULUS

1.  $y = x + 1$   
 $y = x^2 - 4x + 5$



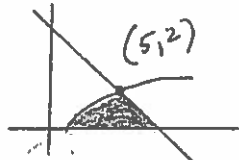
a. Area  $\int_1^4 (x+1) - (x^2 - 4x + 5) dx = 4.5$

b. cross sections perpendicular to x axis are squares  
 $\int_1^4 (x+1 - (x^2 - 4x + 5))^2 dx = 8.1$

c. cross sections perpendicular to x axis are rectangles with height of 3  
 $3 \int_1^4 (x+1) - (x^2 - 4x + 5) dx = 13.5$

d. cross sections perpendicular to x axis are semicircles  $\frac{\pi}{2} \int_1^4 \left( \frac{(x+1) - (x^2 - 4x + 5)}{2} \right)^2 dx = 3.181$

2.  $y = \sqrt{x-1}$   
 $y = 12 - 2x$



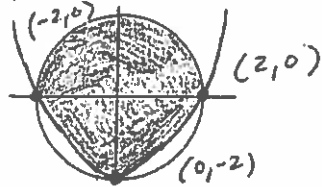
a. Area  $\int_1^5 \sqrt{x-1} dx + \int_5^6 12 - 2x dx = \frac{19}{3}$

b. cross sections perpendicular to x axis are squares  
 $\int_1^5 (\sqrt{x-1})^2 dx + \int_5^6 (12 - 2x)^2 dx = 8 + \frac{4}{3} = \frac{28}{3}$

c. cross sections perpendicular to x axis are rectangles with height of 2  
 $2 \left( \frac{1}{2} \int_1^5 \sqrt{x-1} dx + \int_5^6 12 - 2x dx \right) = \frac{19}{3}$

d. cross sections perpendicular to x axis are semicircles  $\frac{\pi}{2} \left( \int_1^5 \left( \frac{\sqrt{x-1}}{2} \right)^2 dx + \int_5^6 (6-x)^2 dx \right) = 3.665$

3.  $x^2 + y^2 = 4$   
 $y = \frac{1}{2}x^2 - 2$



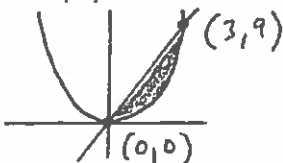
a. Area  $\int_{-2}^2 (\sqrt{4-x^2} - (\frac{1}{2}x^2 - 2)) dx = 11.617$

b. cross sections perpendicular to x axis are squares  
 $\int_{-2}^2 (\sqrt{4-x^2} - (\frac{1}{2}x^2 - 2))^2 dx = 38.050$

c. cross sections perpendicular to x axis are rectangles with height of 5  
 $5 \int_{-2}^2 (\sqrt{4-x^2} - (\frac{1}{2}x^2 - 2)) dx = 58.085$

d. cross sections perpendicular to x axis are semicircles  $\frac{\pi}{2} \int_{-2}^2 \left( \frac{\sqrt{4-x^2} - (\frac{1}{2}x^2 - 2)}{2} \right)^2 dx = 14.942$

4.  $y = x^2$   
 $y = 3x$

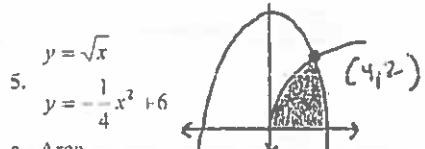


a. Area  $\int_0^3 3x - (x^2) dx = 4.5$

b. cross sections perpendicular to y axis are squares  
 $\int_0^9 (\sqrt{y} - \frac{y}{3})^2 dy = 2.7$

c. cross sections perpendicular to y axis are rectangles with height of 4  
 $4 \int_0^9 (\sqrt{y} - \frac{y}{3}) dy = 18$

d. cross sections perpendicular to y axis are semicircles  
 $\frac{\pi}{2} \int_0^9 \left( \frac{\sqrt{y} - \frac{y}{3}}{2} \right)^2 dy = 2.121$



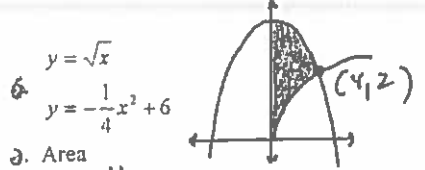
a. Area  $\int_0^2 \sqrt{24-4y} - (y^2) dy = 6.263$

b. cross sections perpendicular to y axis are squares  $\int_0^2 (\sqrt{24-4y} - (y^2))^2 dy = 23.793$

c. cross sections perpendicular to x axis are squares  $\int_0^4 (\sqrt{x})^2 dx + \int_4^{24} (-\frac{1}{4}x^2 + 6)^2 dx = 9.260$

d. cross sections perpendicular to y axis are rectangles with height of 1  $\int_0^2 \sqrt{24-4y} - (y^2) dy = 6.263$

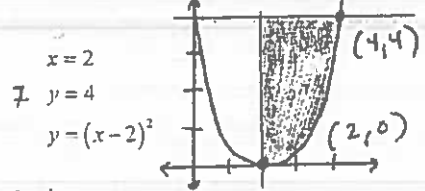
e. cross sections perpendicular to x axis are semicircles.  $\frac{\pi}{2} \int_0^4 (\frac{\sqrt{x}}{2})^2 dx + \frac{\pi}{2} \int_4^{24} (\frac{-\frac{1}{4}x^2 + 6}{2})^2 dx = 3.637$



a. Area  $\int_0^4 (-\frac{1}{4}x^2 + 6) - (\sqrt{x}) dx = 13.333$

b. cross sections perpendicular to x axis are squares  $\int_0^4 (-\frac{1}{4}x^2 + 6 - \sqrt{x})^2 dx = 55.086$

c. cross sections perpendicular to y axis are squares  $\int_0^2 (y^2)^2 dy + \int_2^6 (\sqrt{24-4y})^2 dy = 38.4$



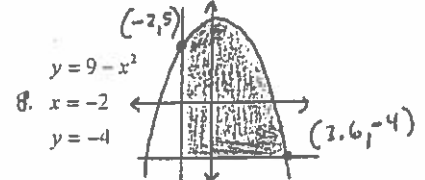
a. Area  $\int_2^4 4 - (x-2)^2 dx = 5.333$

b. cross sections perpendicular to x axis are squares  $\int_2^4 (4 - (x-2)^2)^2 dx = 17.067$

c. cross sections perpendicular to y axis are squares  $\int_0^4 (\sqrt{y} + 2 - 2)^2 dy = 8$

d. cross sections perpendicular to x axis are rectangles with height of 2  $2 \int_2^4 4 - (x-2)^2 dx = 10.667$

e. cross sections perpendicular to y axis are rectangles with height of 3  $3 \int_0^4 (\sqrt{y} + 2 - 2) dy = 16$



a. Area  $\int_{-2}^{3.6} (9 - x^2) - (-4) dx = 54.581$

b. cross sections perpendicular to x axis are squares  $\int_{-2}^{3.6} ((9 - x^2) + 4)^2 dx = 600.647$

c. cross sections perpendicular to y axis are squares  $\int_{-4}^9 ((\sqrt{9-y})^2 - 0) dy + \int_{-4}^9 (-\sqrt{9-y} - (-2))^2 dy = 96.608$