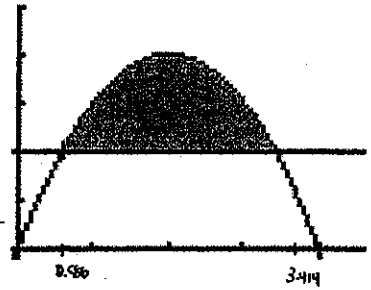
Name _____ Date _____

AP Calculus Volume Quiz — No Calculator

Use the region formed by $h(x) = -x^2 + 4x$ and $k(x) = 2$.
The intersection points are $x = 0.586$ and $x = 3.414$.
Write, but do not evaluate, each integral expression.



1. Find the area of the region.

2. Find the volume rotated about the x-axis.

3. Find the volume rotated about the y-axis.

4. Find the volume rotated about the line $y = -4$.

5. Find the volume rotated about the line $y = 7$.

6. Find the volume rotated about the line $x = 5$.

7. Find the volume rotated about the line $x = -2$.

8. Find the volume rotated about the line $y = 2$.

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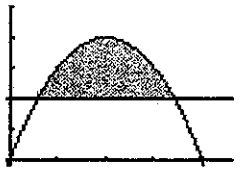

9. The base of a solid is the region from the previous problems. Find the volume of the solid if the cross-sections perpendicular to the x-axis are squares.

10. The base of a solid is the region from the previous problems. Find the volume of the solid if the cross-sections perpendicular to the x-axis are semi-circles.

11. The base of a solid is the region from the previous problems. Find the volume of the solid if the cross-sections perpendicular to the x-axis are rectangles with the height being 3 times that of the length of the rectangle.

11. The base of a solid is the region from the previous problems. Find the volume of the solid if the cross-sections perpendicular to the x-axis are isosceles right triangles with the leg being in the region.

Name Key Date

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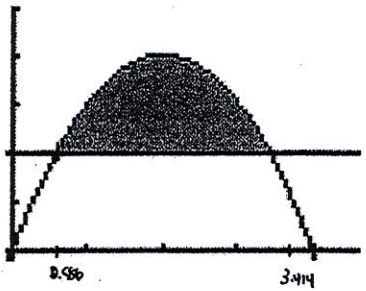

1. Find the area of the region.

$$\int_{.586}^{3.4} [(-x^2+4x) - 2]\,dx$$

2. Find the volume rotated about the x-axis.

$$\pi \int_{.586}^{3.4} [(-x^2+4x)^2 - 4]\,dx$$

3. Find the volume rotated about the y-axis.

$$2\pi \int_{.586}^{3.4} \underset{\text{radius}}{x}\,(-x^2+4x-2)\,dx$$

4. Find the volume rotated about the line $y = -4$.

$$\pi \int_{.58}^{3.4} [(-x^2+4x-\,-4)^2 - (2-\,-4)^2]\,dx$$

5. Find the volume rotated about the line $y = 7$.

$$\pi \int_{.58}^{3.4} [(7-2)^2 - (7-(-x^2+4x))^2\,dx$$

6. Find the volume rotated about the line $x = 5$.

$$2\pi \int_{.58}^{3.4} (5-x)(-x^2+4x-2)\,dx$$

7. Find the volume rotated about the line $x = -2$.

$$2\pi \int_{.58}^{3.4} (x-\,-2)(-x^2+4x-2)\,dx$$

8. Find the volume rotated about the line $y = 2$.

$$\pi \int_{.58}^{3.4} (-x^2+4x-2)^2\,dx$$

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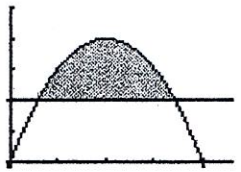


9. The base of a solid is the region from the previous problems. Find the volume of the solid if the cross-sections perpendicular to the x-axis are squares.

side in R

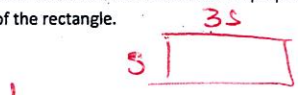
$$\int_{.58}^{3.4} (-x^2+4x-2)^2\,dx$$

10. The base of a solid is the region from the previous problems. Find the volume of the solid if the cross-sections perpendicular to the x-axis are semi-circles.

Diameter in R

$$\frac{\pi}{2} \int_{.58}^{3.4} \left(\frac{-x^2+4x-2}{2}\right)^2 dx$$

11. The base of a solid is the region from the previous problems. Find the volume of the solid if the cross-sections perpendicular to the x-axis are rectangles with the height being 3 times that of the length of the rectangle.



$$3 \int_{.586}^{3.4} (-x^2+4x-2)^2\,dx$$

11. The base of a solid is the region from the previous problems. Find the volume of the solid if the cross-sections perpendicular to the x-axis are isosceles right triangles with the leg being in the region.

$$\frac{\int_{.58}^{3.4} (-x^2+4x-2)^2\,dx}{\sqrt{2}}$$

$$\frac{1}{2} \int_{.58}^{3.4} (-x^2+4x-2)^2\,dx$$