

Name _____

Set up the integral and calculate the volume “exactly” (accurate to 4 decimal places) using your newly acquired calculus prowess. Use a computer graphing utility such GraphCalc (Windows –www.graphcalc.com) or Grapher (Mac OS X – Math Lab) to determine the 2D region and any intersection points.

1. $f(x) = 3 - x \quad g(x) = \frac{x^2}{\sqrt{x^3 + 3}} \text{ and } x = 0$

- a. Rotate about the x-axis
- b. Rotate about the line $y = -1$
- c. Rotate about the line $y = 4$
- d. Cross sections perpendicular to the x-axis that are rectangles with height 3 times the base

2. $f(x) = 6 - \frac{x}{2} \quad g(x) = \frac{0.8(x-1)^2}{\sqrt{x^3 + 3}} \text{ and } x = 0$

- a. Cross sections perpendicular to the x-axis that are semi-circles.
- b. Cross sections perpendicular to the x-axis that are squares
- c. Cross sections perpendicular to the x-axis that are equilateral triangles

3. $f(x) = 3 - x \quad g(x) = \frac{x^2}{\sqrt{x^3 + 3}} \text{ and } y = 0$

- a. Rotate about the x-axis
- b. Rotate about the line $y = -1$
- c. Rotate about the line $y = 2$

4. $f(x) = 6 - \frac{x}{2} \quad g(x) = \frac{3(x-1)^2}{\sqrt{x^3 + 3}} \text{ and } y = 0$

- a. Cross sections perpendicular to the x-axis that are triangles with height equal to the base
- b. Cross sections perpendicular to the x-axis that are squares
- c. Cross sections perpendicular to the x-axis that are semi-circles.

5. $f(x) = -2x^2 + 6x + 1 \quad g(x) = x + 0.2x^3 \text{ and } x = 0$

- a. Rotate about the x-axis
- b. Rotate about the line $y = -2$
- c. Rotate about the line $x = 3$

6. $f(x) = -0.7x^2 + 5x + 1 \quad g(x) = 0.1x + 0.03x^3 \text{ and } x = 0$

- a. Cross sections perpendicular to the x-axis that are semi-circles.
- b. Cross sections perpendicular to the x-axis that are squares
- c. Cross sections perpendicular to the x-axis that are triangles

7. $f(x) = 1 - e^{-x} \quad g(x) = \ln|x| \text{ and } x = 0$

- a. Rotate about the y-axis
- b. Rotate about the line $x = -1$
- c. Rotate about the line $y = 2$

8. $f(x) = 5 - 5e^{-x}$ $g(x) = 2.3 \ln|x-1|$

- a. Cross sections perpendicular to the x-axis that are equilateral triangles
- b. Cross sections perpendicular to the x-axis that are squares
- c. Cross sections perpendicular to the x-axis that are semi-circles

9. $f(x) = 4e^{-0.3x}$ $g(x) = \ln\left|\frac{x}{2}\right|$ and $x = 0$

- a. Rotate about the y-axis
- b. Rotate about the vertical line passing through the intersection of the 2 functions in the 1st quadrant.
- c. Cross sections perpendicular to the x-axis that are rectangles with height $2x$ the base.
- d. Rotate about the x-axis

10. $f(x) = 5e^{-0.2x}$ $g(x) = \ln\left|\frac{x}{3}\right|$ and $x = 0$

- a. Cross sections perpendicular to the x-axis that are semi-circles.
- b. Cross sections perpendicular to the x-axis that are squares
- c. Cross sections perpendicular to the x-axis that are rectangles with height equal to $\frac{1}{2}$ the base.

11. $f(x) = 0.3x^2 + 0.5$ $g(x) = -0.2x^3 + 3x$

- a. Rotate about the line $x = -2$
- b. Rotate about the line $x = 3.5$
- c. Rotate about the line $y = -1$
- d. Cross sections perpendicular to the x-axis that are rectangles with height equal to 2.5 times the base

12. $f(x) = 0.1x^2 + 0.5$ $g(x) = -0.1x^3 + 4x$

- a. Cross sections perpendicular to the x-axis that are equilateral triangles
- b. Cross sections perpendicular to the x-axis that are squares
- c. Cross sections perpendicular to the x-axis that are semi-circles.

13. $f(x) = (x-2)^3 - 2x+8$, $y=0$, $x=3.5$

- a. Rotate about the x-axis
- b. Rotate about the line $y = 5.5$
- c. Rotate about the line $y = -0.5$
- d. Cross sections perpendicular to the x-axis that are rectangles with height equal to 2 times the base.

14. $f(x) = (0.9x - 1.5)^3 - 1.5x + 3.5$, $g(x) = (0.3x)^2 + 3$, $x=0$, $x=3.5$

- a. Rotate about the x-axis
- b. Rotate about the line $y = 5$
- c. Rotate about the line $y = -1$
- d. Cross sections perpendicular to the x-axis that are isosceles triangles with tall sides equal to 2 times the base.

15. $f(x) = (0.9x - 2)^3 - x + 6$, $g(x) = (0.4x)^2$, $x=3.5$

- a. Rotate about the x-axis
- b. Rotate about the line $y = 4.5$
- c. Rotate about the line $y = -1$
- d. Cross sections perpendicular to the x-axis that are rectangles with height equal to 2 times the base.

16. $f(x) = (0.5x - 2)^3 - x + 9$, $y=0$, $x=0$, $x=8$

- a. Cross sections perpendicular to the x-axis that are equilateral triangles
- b. Cross sections perpendicular to the x-axis that are squares
- c. Cross sections perpendicular to the x-axis that are semi-circles.
- d. Cross sections perpendicular to the x-axis that are rectangles with height equal to 1/2 times the base.

17. $f(x) = (0.5x - 2)^3 - x + 9$, $g(x) = (0.2x)^2$, $y=0$, $x=0$, $x=8$

- a. Cross sections perpendicular to the x-axis that are equilateral triangles
- b. Cross sections perpendicular to the x-axis that are squares
- c. Cross sections perpendicular to the x-axis that are semi-circles.
- d. Cross sections perpendicular to the x-axis that are rectangles with height equal to 1/2 times the base.











