

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](http://www.graphcalc.com)) or Grapher (Mac OS X – Math Lab) to determine the 2D region and any intersection points.

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

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

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

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

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

- Rotate about the x-axis
- Rotate about the line  $y = -1$
- Rotate about the line  $y = 2$

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

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

5.  $f(x) = -2x^2 + 6x + 1$     $g(x) = x + 0.2x^3$    and  $x = 0$

- Rotate about the x-axis
- Rotate about the line  $y = -2$
- Rotate about the line  $x = 3$

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

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

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

- Rotate about the y-axis
- Rotate about the line  $x = -1$
- Rotate about the line  $y = 2$

8.  $f(x) = 5 - 5e^{-x}$      $g(x) = 2.3 \ln|x-1|$
- Cross sections perpendicular to the x-axis that are equilateral triangles
  - Cross sections perpendicular to the x-axis that are squares
  - 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  $x = 0$
- Rotate about the y-axis
  - Rotate about the vertical line passing through the intersection of the 2 functions in the 1<sup>st</sup> quadrant.
  - Cross sections perpendicular to the x-axis that are rectangles with height 2x the base.
  - Rotate about the x-axis
10.  $f(x) = 5e^{-0.2x}$      $g(x) = \ln\left|\frac{x}{3}\right|$  and  $x = 0$
- Cross sections perpendicular to the x-axis that are semi-circles.
  - Cross sections perpendicular to the x-axis that are squares
  - Cross sections perpendicular to the x-axis that are rectangles with height equal to  $\frac{1}{2}$  the base.
11.  $f(x) = 0.3x^2 + 0.5$      $g(x) = -0.2x^3 + 3x$
- Rotate about the line  $x = -2$
  - Rotate about the line  $x = 3.5$
  - Rotate about the line  $y = -1$
  - Cross sections perpendicular to the x-axis that are rectangles with height equal to 2.5 times the base
12.  $f(x) = 0.1x^2 + 0.5$      $g(x) = -0.1x^3 + 4x$
- Cross sections perpendicular to the x-axis that are equilateral triangles
  - Cross sections perpendicular to the x-axis that are squares
  - Cross sections perpendicular to the x-axis that are semi-circles.
13.  $f(x) = (x-2)^3 - 2x + 8$ ,  $y=0$ ,  $x=3.5$
- Rotate about the x-axis
  - Rotate about the line  $y = 5.5$
  - Rotate about the line  $y = -0.5$
  - Cross sections perpendicular to the x-axis that are rectangles with height equal to 2 times the base.
14.  $f(x) = (0.9x - 1.5)^3 - 1.5x + 3.5$ ,  $g(x) = (0.3x)^2 + 3$ ,  $x=0$ ,  $x=3.5$
- Rotate about the x-axis
  - Rotate about the line  $y = 5$
  - Rotate about the line  $y = -1$
  - Cross sections perpendicular to the x-axis that are isosceles triangles with tall sides equal to 2 times the base.
15.  $f(x) = (0.9x - 2)^3 - x + 6$ ,  $g(x) = (0.4x)^2$ ,  $x=3.5$
- Rotate about the x-axis
  - Rotate about the line  $y = 4.5$
  - Rotate about the line  $y = -1$
  - Cross sections perpendicular to the x-axis that are rectangles with height equal to 2 times the base.

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

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

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

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













