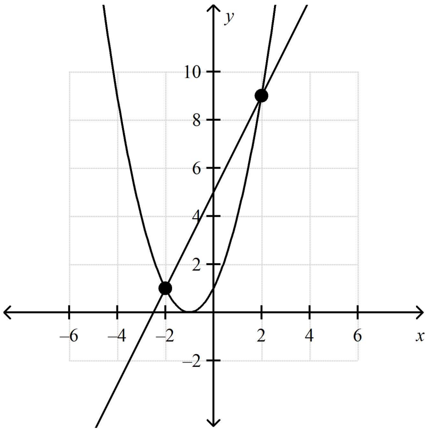
The Governor's School @ Innovation Park
A STEM INITIATIVE IN COLLABORATION WITH GEORGE MASON UNIVERSITY

Name

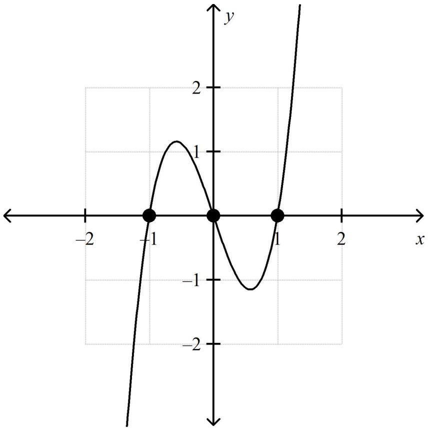
Summer Assignment for Calc III (M215)

Set up the definite integral that gives the area of the region between the curves.

1. $y_1 = x^2 + 2x + 1, \quad y_2 = 2x + 5$



2. $y_1 = 3\left(x^3 - x\right), \quad y_2 = 0$



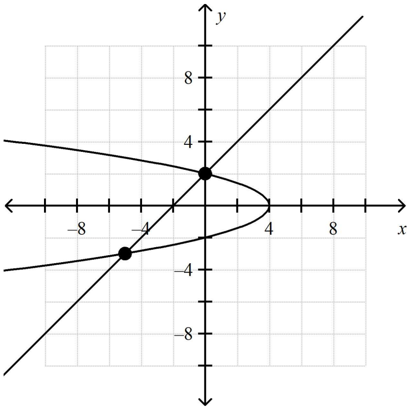
Find the area of the region between the two functions by integrating

__(a)__ with respect to x and

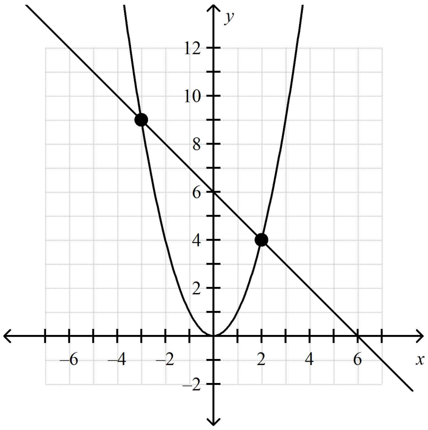
__(b)__ with respect to y.

__(c)__ Compare your results. Which method is simpler?

3. $x = 4 - y^2, \quad x = y - 2$



4. $y = x^2, \quad y = 6 - x$



5. $y = 2x^2$, $y = 0$, $x = 2$

(a) the y-axis
(b) the x-axis
(a) the line $y = 8$
(a) the line $x = 2$

Sketch the region bounded by the graphs of the algebraic functions and find the area of the region.

6. $y = -x^3 + 3$, $y = x$, $x = -1$, $x = 1$

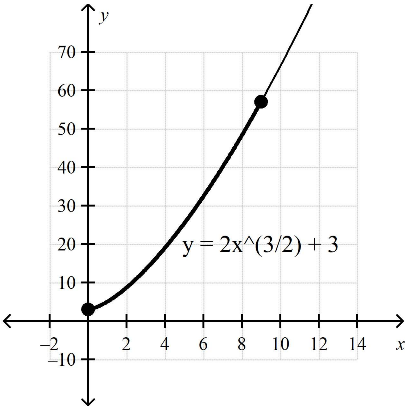
7. $f(x) = -x^2 + 4x + 1$, $g(x) = x + 1$

Set up an integral for the length of the curve.

8. $y = x^4$, $0 \le x \le 1$

Find the arc length of the graph of the function over the indicated interval. You can use a calculator to calculate the final value - but you need to show all your work (i.e. don't evaluate the integral using the calculator)

9. $y = 2x^{\frac{3}{2}} + 3$ $\quad 0 \le x \le 9$



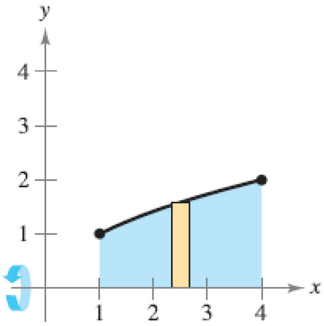
Find a set of parametric equations for the line or conic.

10. Line passes through $(1, 4)$ and $(5, -2)$

11. Circle: center $(-6, 2)$; radius: 4.

Set up and evaluate the integral that gives the volume of the solid formed by revolving the region about the x-axis.

12. $y = \sqrt{x}$



Plot the point in polar coordinates and find the corresponding rectangular coordinates for the point.

13. $\left(8, \dfrac{\pi}{2}\right)$

14. $\left(-4, \dfrac{-3\pi}{4}\right)$

Convert the rectangular equation to polar form and sketch its graph.

15. $x^2 - y^2 = 9$

16. $3x - y + 2 = 0$

Convert the polar equation to rectangular form and sketch its graph.

17. $r = 3\sin\theta$

18. $\theta = \dfrac{5\pi}{6}$

Find the area of the region.

19. Inside $r = a(1 + \cos\theta)$ and outside $r = a\cos\theta$

20. Inside $r = 2a\cos\theta$ and outside $r = a$