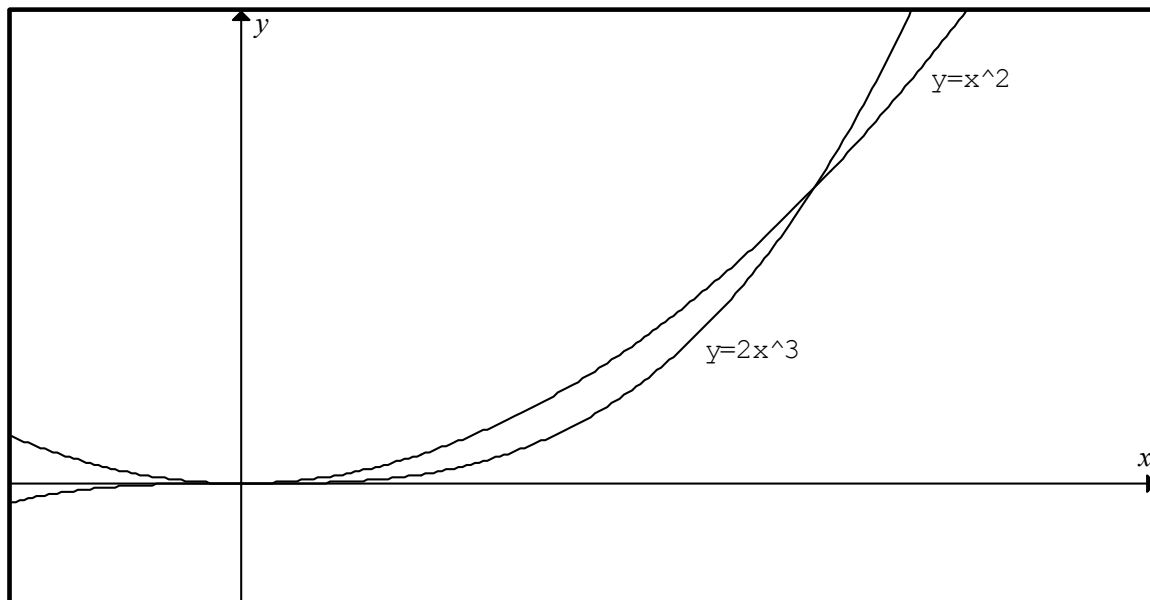


You must show all your work on this paper. Solutions without correct supporting work will not be accepted. **All answers must be exact unless otherwise indicated.** You must omit one problem of your choice by clearly writing "OMIT" by the problem number. You may work the problem you omit for up to 5 points extra credit if you wish.

Consider the graph of  $y = x^2$  and  $y = 2x^3$  to answer the questions below.



1. Set up, but do not evaluate, the integral to find the area of the region bounded by the curves.
2. Set up, but do not evaluate, the integral to find the volume of the solid generated by revolving the region about the x-axis.
3. Set up, but do not evaluate, the integral to find the volume of the solid generated by revolving the region about the y-axis.
4. Set up, but do not evaluate, the integral to find the volume of the solid generated by revolving the region about the line  $y = 4$ .

5. Find the arc length of the graph of  $y = \frac{2}{3}x^{3/2} + 1$  over the interval  $[0,1]$ .
6. A rectangular tank with a base of 4 ft by 7ft and a height of 6 ft is full of water. How much work is done in pumping water out over the top edge in order to empty **half** of the tank? (Set up the integral, but do not evaluate it.)
7. Find the work done in stretching a spring from its natural length of 10 inches to a length of 15 inches, if a force of 4 pounds is needed to stretch it 1 inch from its natural position.
8. Consider a spherical tank whose radius is 7 ft and whose center is 12 ft above the ground. How much work is required to fill this tank by pumping oil that has density  $50 \text{ lb/ft}^3$  up from ground level? (Set up the integral, but do not evaluate.)

9. Evaluate  $\int \frac{\ln x}{x^5} dx$

10. Evaluate  $\int e^x \sin 3x dx$

11. Evaluate  $\int x \arcsin x^2 dx$

**Make sure you indicated which problem you wish to omit!**