

## READING ASSIGNMENT 04

§6.1 (Area between curves), §6.2 (Setting up integrals)

NAME: SOLUTIONS

Due 2 July 2018

### LEARNING OBJECTIVES

By the end of this lesson, you will be able to:

- compute the area between two curves,
- use integrals to find the volume of a solid body by integrating cross-sectional areas,
- find total quantities (mass, population, flow rate) by integrating marginal quantities (density, population density, flux),
- use integrals to find the average value of a function across an interval.

### REVIEW

- This section relies on basic geometry: the Pythagorean theorem, similar triangles, and your ability to visualize the cross-sections of shapes in 3D. You may not need to review these skills, but it will help to keep them in mind!

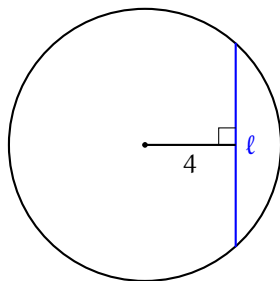
### READING

- Read section 6.1 from the beginning through Example 3, but stop before the “Integration along the y-Axis” subsection on page 283. Read the section summary on page 285.
- Read section 6.2, but skip the “Flow Rate” subsection on pages 292-293.

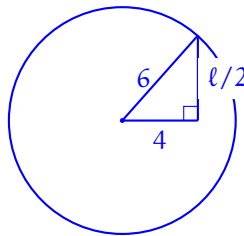
### QUESTIONS

(1) Find the missing length  $\ell$  in the figures below.

(a) The circle has radius 6.

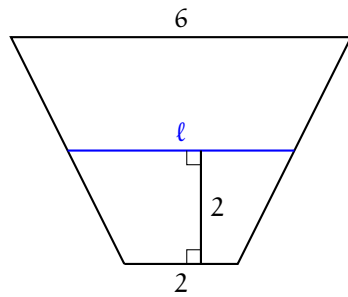


SOLUTION: It may help to add a line to the picture.

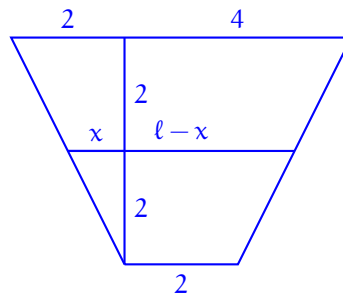


Then  $\ell/2 = \sqrt{6^2 - 4^2} = \sqrt{36 - 16} = \sqrt{20} = 2\sqrt{5}$ , so  $\ell = 4\sqrt{5}$ .

- (b) The height of the trapezoid is 4. (*Hint: similar triangles.*)



SOLUTION: It may help to add to the picture.



By similar triangles, the length marked  $x$  is 1, and  $l = 2x + 2$ . Hence,  $l = 4$ .

- (2) Write down formulas for the following shapes:

- (a) A parabola opening to the right with apex at  $(-3, 0)$ , symmetric about the  $x$ -axis.

SOLUTION:  $x = y^2 - 3$

- (b) A circle with radius 3 and center  $(-2, 4)$ .

SOLUTION:  $(y - 4)^2 + (x + 2)^2 = 9$