Math 32, Homework 2 on sections 5.1, 5.2

Write all your working out and answers on your own notepaper - no need to write the questions. Please use lots of space.

It is very important that you show clearly any work you had to do to get your answers. Just writing the answer down with no work shown is not enough. All 15 questions are worth 2 points each. Hand in your solutions next week only.

Do these first 10 questions and *check that your answers match the solutions on page 3*. If you don't get the same answers then look at your notes or the book or ask me. Only do the last five questions when you are sure you understand the first ten.

(1) Sketch the region enclosed by the following curves and vertical lines. Then find its area.

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

(2) Sketch the region enclosed by the following curves and vertical lines. Then find its area.

$$y = \sin x, \quad y = 1 + \sin x, \quad x = 0, \quad x = 2\pi.$$

(3) Sketch the region enclosed by the following curves and vertical line. Then find its area.

$$y = \sqrt{x}, \quad y = 1/x^2, \quad x = 4.$$

(4) Sketch the region enclosed by the following curve and line. Then find its area.

$$x = y^2 - 1, \quad x = y + 1.$$

(5) Find the area enclosed by these two curves:

$$y = x, \quad y = x^3.$$

(6) Suppose the cross-sectional area of a solid that lies between $x = 1$ and $x = 10$ is given by $A(x) = 4x$. What is the volume of this solid?

(7) Sketch and find the volume of the solid obtained by rotating the region bounded by the following curves about the x-axis:

$$y = x + 2, \quad y = 0, \quad x = 0, \quad x = 3.$$

(8) Find the volume of the solid obtained by rotating the region bounded by the following curves about the y-axis:

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

(9) Set up the integral and find the volume of the solid obtained by rotating the region bounded by the following curves about the horizontal line $y = 3$:

$$y = x, \quad y = 0, \quad x = 1.$$

(10) Find the volume of the following solid S. The base of S is the triangular region with vertices $(0, 0)$, $(2, 0)$ and $(0, 2)$. Cross-sections perpendicular to the x-axis are squares.

Five more questions. Show clearly all your working out and reasoning.

(11) Sketch the region enclosed by the following curves and vertical lines. Then find its area.

$$y = \sin x, \quad y = 1 + \cos x, \quad x = 0, \quad x = 2\pi.$$

(12) Sketch the region enclosed by the following curve and line. Then find its area.

$$y = 4 - x^2, \quad y = -5.$$

(13) Suppose the cross-sectional area of a solid that lies between $x = 0$ and $x = 4$ is given by $A(x) = \sqrt{x}$. What is the volume of this solid?

(14) Find the volume of the solid obtained by rotating the region bounded by the following curves about the x-axis:

$$y = 1/x, \quad y = 0, \quad x = 1, \quad x = 5.$$

(15) Find the volume of the solid obtained by rotating the region bounded by the following curves about the horizontal line $y = -3$:

$$y = x^3, \quad y = 1, \quad x = 2.$$

You can also try questions from sections 5.1, 5.2 in the book listed on the syllabus.

Answers to questions (1)-(10) on next page

Answers to questions (1)-(10):

(1) Sketch the region as we did in class. The area is $119/12$

(2) 2π

(3) $47/12$

(4) $9/2$

(5) $1/2$

(6) The volume is 198.

(7) Sketch the solid as we did in class. The integral for the volume is

$$\int_0^3 \pi(x+2)^2\,dx$$

and the volume is 39π.

(8) 55π

(9) The integral for the volume is

$$\int_0^1 \pi(3^2-(3-x)^2)\,dx$$

and the volume is $8\pi/3$.

(10) $8/3$