

MATH 101 V01 – ASSIGNMENT 5

There are two parts to this assignment. The first part is on WeBWork — link to it using Canvas, and go to MATH 101.V01 (after 9:00 am Friday, February 2). The second part consists of the questions on this page. You are expected to provide full solutions with complete justifications. You will be graded on the mathematical, logical and grammatical coherence and elegance of your solutions. Your solutions must be typed, with your name and student number at the top of the first page. If your solutions are on multiple pages, the pages must be stapled together.

Your written assignment must be handed in **before your recitation on Friday, February 9**. The online assignment will close at **9:00 a.m. on Friday, February 9**.

1. (a) Determine all values of the real number p such that the following integral converges:

$$\int_1^{\infty} \frac{1}{x^p} dx.$$

If the integral converges, find its value.

- (b) Determine all values of the real number q such that the following integral converges:

$$\int_0^1 \frac{1}{x^q} dx.$$

If the integral converges, find its value.

2. Let R be the bounded region between the two curves $y = \sqrt[4]{x}$ and $y = x$. Find the volume of the solid that is generated by rotating the region R about the vertical line $x = 1$:
- (a) Using slices.
- (b) Using cylindrical shells.