

MATH 101 V01 – ASSIGNMENT 6

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, March 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, March 9**. The online assignment will close at **9:00 a.m. on Friday, March 9**.

1. Use the Integral Test to determine if the series is convergent or divergent.

(a) $1 + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{5}} + \frac{1}{\sqrt{7}} + \dots$

(b) $\sum_{n=2}^{\infty} \frac{1}{n(\log(n))^3}$

(c) $\sum_{n=2}^{\infty} \frac{\log(n^2)}{n}$

2. Find a power series representation for the function and determine the interval of convergence.

(a) $f(x) = \frac{x^3}{4x^2+3}$

(b) $f(x) = \frac{x+2}{2x^2-x-1}$

(c) $f(x) = \log(3+x)$

(d) $f(x) = \arctan(3x)$

(e) $f(x) = \frac{2x}{(1+x^2)^2}$

3. Let D_1 be the closed disk (circle together with its interior region) of radius R centred at the origin and let D_2 be the closed disk of radius R centred at the point $(0, \sqrt{3}R)$. Determine the area of the region of the intersection (or overlap) of D_1 and D_2 (the shaded region in the figure below).

