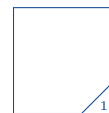


FORENAME: SURNAME: STUDENT NO: 

2018–19 Autumn

MATH115 Basic Mathematics – Homework 2

N. Course

DEADLINE: Tuesday 16 October 2018, 3pm

Exercise 6 (Continuity). At which points is the function $g(x) = \frac{1}{|x|+1} - \frac{x^2}{2}$ continuous? Explain your answer.

Exercise 7 (Limits Involving Trigonometric Functions). Calculate $\lim_{x \rightarrow \pi} \sin \left(x - \sin \left(x - \sin(x - \sin x) \right) \right)$.

Exercise 8 (Continuity). For what value(s) of b is $f(x) = \begin{cases} x^2 - 1 & x < 2 \\ bx^2 & x \geq 2. \end{cases}$ continuous at every x ? Why?

Exercise 9 (Limits Involving Infinity). Find the following limits, **without using l'Hôpital's rule**, if they exist. If the limit does not exist, then you must explain why it does not exist.

(a) $\lim_{x \rightarrow \infty} \left(\sqrt{x^2 + x} - \sqrt{x^2 - x} \right)$

(b) $\lim_{x \rightarrow -\infty} \frac{4 - 3x^2}{\sqrt{x^6 + 6x^3 + 9}}$

Exercise 10 (Limits Involving Infinity). Find the following limits, **without using l'Hôpital's rule**, if they exist. If the limit does not exist, then you must explain why it does not exist.

(a) $\lim_{x \rightarrow -5} \frac{3x}{2x + 10}$

(b) $\lim_{p \rightarrow 0} \frac{1}{p^{\frac{2}{3}}}$