FORENAME:

SURNAME:

STUDENT NO:

12

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 $\lim_{x\to\pi} \sin\Big(x - \sin\big(x - \sin(x - \sin x)\big)\Big)$.

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

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

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) $\lim_{x\to-5}\dfrac{3x}{2x+10}$

(b) $\lim_{p\to0}\dfrac{1}{p^{\frac{2}{3}}}$

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