FORENAME:

SURNAME:

STUDENT NO:

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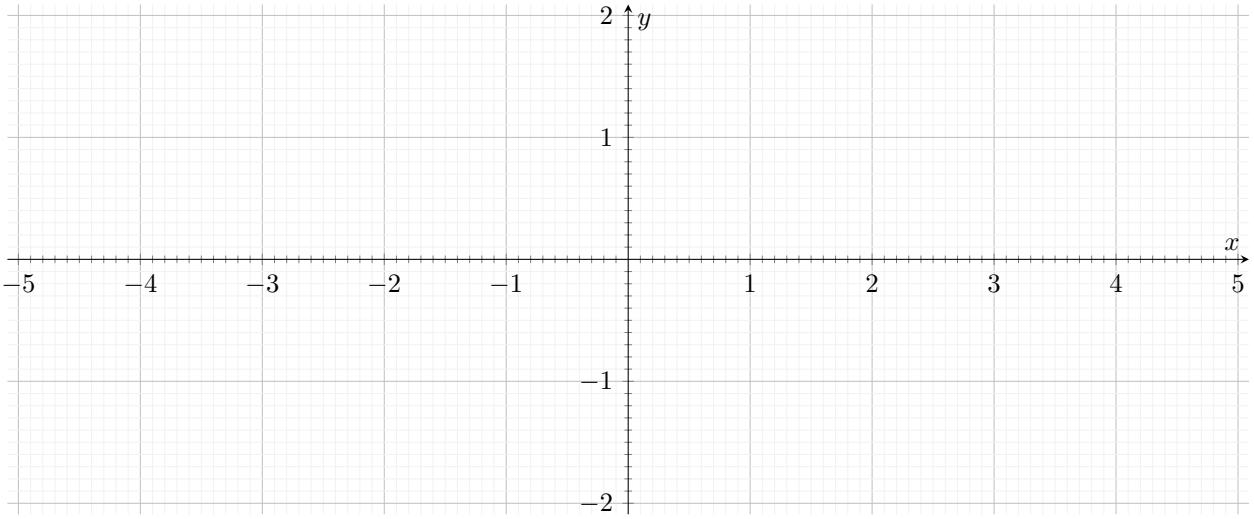
2018–19 Autumn **MATH115 Basic Mathematics – Homework 1** N. Course

DEADLINE: Tuesday 9 October 2018, 3pm

Exercise 1 (Even and Odd Functions). State whether the following functions are even, odd or neither. The first one is done for you.

(ω)	$f(x) = 3$	☑ even	☐ odd	☐ neither
(a)	$f(x) = x^{11}$	☐ even	☐ odd	☐ neither
(b)	$f(x) = x^2 - x^6$	☐ even	☐ odd	☐ neither
(c)	$f(x) = \lvert x^3 + x^7 \rvert$	☐ even	☐ odd	☐ neither
(d)	$f(x) = \frac{1}{x^4+3}$	☐ even	☐ odd	☐ neither
(e)	$f(x) = \sec x$	☐ even	☐ odd	☐ neither
(f)	$f(x) = \sec(x-1)$	☐ even	☐ odd	☐ neither

Exercise 2 (Pointwise-Defined Functions). Graph the function $g : \mathbb{R} \to \mathbb{R}$ defined by $g(x) = \begin{cases} \frac{x+3}{2}, & x < 0 \\ 0 & 0 \le x \le 2 \\ 2x - 4 & x > 2. \end{cases}$



Exercise 3 (Limits). Consider the following calculation. State which limit laws are used at each step.

$$\lim_{x\to 1} \frac{\sqrt{5(6-x)}}{x(4-2x)} = \frac{\lim_{x\to 1}\sqrt{5(6-x)}}{\lim_{x\to 1}\big(x(4-2x)\big)}$$ by the ☐ rule,

$$= \frac{\sqrt{\lim_{x\to 1} 5(6-x)}}{(\lim_{x\to 1} x)\,(\lim_{x\to 1}(4-2x))}$$ by ☐

$$= \frac{\sqrt{5\lim_{x\to 1}(6-x)}}{(\lim_{x\to 1} x)\,(\lim_{x\to 1} 4 - \lim_{x\to 1} 2x))}$$ by ☐

$$= \frac{\sqrt{(5)(5)}}{(1)(4-2)} = \frac{5}{2}.$$

Please remember to add your signature before submitting.

Exercise 4 (Limits). Find the following limits **without using l'Hôpital's rule**. For each one, **state which limit laws or other theorems you are using**. The first one is done for you.

(ω) $\lim_{y\to -5} \dfrac{y^2}{y-5} = \dfrac{\lim_{y\to -5} y^2}{\lim_{y\to -5}(y-5)} = \dfrac{25}{-10} = \dfrac{-5}{2}$ by the quotient, power and difference rules.

(a) $\lim_{x\to 0} (2x-8)^{\frac{1}{3}} =$

(b) $\lim_{t\to -1} \dfrac{t^2+3t+2}{t^2-t-2} =$

(c) $\lim_{v\to 9} \dfrac{4v-v^2}{2-\sqrt{v}} =$

Exercise 5 (The [redacted] Theorem). If $x^4 - x^2 + 1 \leq g(x) \leq 2x^4 - 2x^2 + 1$ for all $x \in (-1, 1)$, find $\lim_{x\to 0} g(x)$. State which limit laws or other theorems you are using.

I declare that this assignment is entirely my own work. I did not copy from another student and I did not allow anyone to copy from me. *Bu ödevin tamamen kendi çalışmamın ürünü olduğunu, başka bir öğrencinin ödevini kopyalamadığımı; başkasının da benim çalışmamı kopyalamasına izin vermediğimi beyan ederim.*

SIGNATURE: