Tutorial Quiz 2018

MATH1014 - Mathematics and Applications 2

Tutorial Quiz 2
Calculus and Linear Algebra

Reading time: 1 minute
Writing time: 12 minutes

Student Name: _____
University ID: _____

Question and Answer Book

Structure of Book

Number of questions	*Number of questions to be answered*	*Number of marks*
2	2	10

- Students are NOT permitted any calculators or notes during the quiz.
- Students are NOT permitted to colaborate in any form during the quiz. Any signs of collaboration or cheating will result in a nullified score and the course convenor will be informed of any academic misconduct.

Materials supplied
- Question and answer booklet of 5 pages.
- Working space is provided throughout the booklet.

Instructions
- Write your **student number** in the space provided above on this page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

Instructions

Answer **all** questions in the space provided.
In all questions where a numerical answer is required, an exact value must be given unless otherwise specified.
In questions where more than one mark is available, appropriate working **must** be shown.
Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1

Let $\mathcal{H}_1 \subset \mathbb{R}^3$ be the plane given by the equation $x + y + z = 1$, and $\mathcal{H}_2 \subset \mathbb{R}^3$ be the plane given by the equation $x - y + z = 1$.

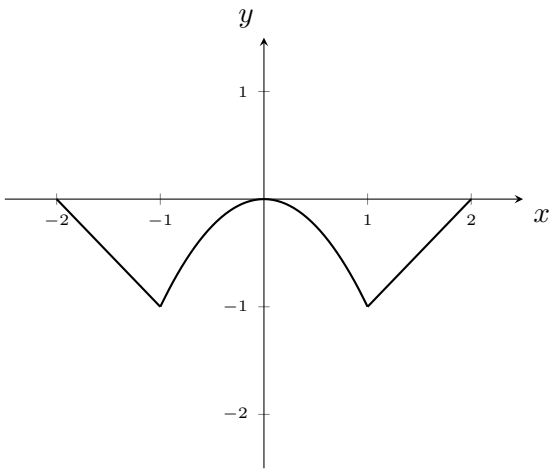
(a) Let $\mathfrak{n}_1$ and $\mathfrak{n}_2$ denote the normal vectors to the planes $\mathcal{H}_1$ and $\mathcal{H}_2$, respectively.

Determine $\mathfrak{n}_1$ and $\mathfrak{n}_2$. [2 marks].

(b) Hence, or otherwise, determine whether $\mathcal{H}_1$ and $\mathcal{H}_2$ are orthogonal to each other. If they are not, determine the angle between them. [2 marks].

Question 2

Consider the function $f : \mathbb{R} \longrightarrow \mathbb{R}$ whose derivative f' is given by



Note that for $x \in (-\infty, -2] \cup [2, \infty)$, the function is identically zero, i.e., $f'(x) = 0$.

Moreover, f' passes through the points $(-2, 0)$, $(-1, -1)$, $(0, 0)$, $(1, -1)$, and $(2, 0)$.

(a) Determine the equation for f. [3 marks].

(b) Determine where f is differentiable. [1 mark].

(c) Determine where f' is differentiable. [1 mark].

(d) Evaluate $\int_{-\infty}^{\infty} f(x)dx$. [1 mark].

END OF TUTORIAL QUIZ.