MATH1003
QUIZ 2

This quiz has four questions, with each question worth 5 marks.
The quiz lasts for thirty minutes. No calculator, textbooks, or other notes are allowed.

1. Let:

$$f(x) = \begin{cases} \dfrac{x^2-4}{x-2}, & \text{when } x < 2; \\ ax^2 - bx + 3, & \text{when } 2 \le x < 3; \\ 2x - a + b, & \text{when } x \ge 3. \end{cases}$$

Find the values of a and b that make f continuous everywhere.

2. Use the Intermediate Value Theorem to show that there is a solution to each of the following equations in the specified intervals:

(i) $\cos x = x$ in the interval $(0, 1)$,

(ii) $\ln x = e^{-x}$ in the interval $(1, 2)$.

3. Find the horizontal and vertical asymptotes of $y = \dfrac{x^2+1}{2x^2-3x-2}$. Use this information to sketch the graph.

4. Find the derivative of $y = \tan^2 3x$.

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