

Midterm

考試注意事項：

1. 答案紙直行對折，兩直欄書寫作答。
2. 無清楚計算過程，不予計分。
3. 此次考試，禁用羅必達規則 (No use of L'Hôpital's rule in this test!)。

試題：

1. (15%) Use the First Derivative Test to find the relative extrema of

$$f(x) = x^4 - 4x^3 + 12.$$

2. (15%) Use the Second Derivative Test to find the relative extrema of

$$f(x) = x^3 - 3x^2 - 24x + 32.$$

3. (15%) Find the slant asymptotes of the graph of

$$f(x) = \frac{2x^2 - 3}{x - 2}.$$

4. (15%) Evaluate the limit of a Riemann Sum to find the definite integral

$$\int_{-1}^3 (4 - x^2) dx.$$

(No use of The Fundamental Theorem of Calculus!)

5. (10%) Find the point of inflection of $f(x) = (x - 1)^{1/3}$.
6. (5%,5%) Find the horizontal asymptotes of the graph of the function $f(x) = \frac{3x}{\sqrt{x^2 + 1}}$.
7. (10%) Find the indefinite integral $\int \sqrt{1 - 2x} dx$.
8. (10%) Find the indefinite integral $\int \frac{\sec x \tan x}{(\sec x - 1)^2} dx$.