

## First 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。

試題：

1. (15%) Find  $\int \frac{4x^3 + x}{2x^2 + x - 3} dx$ .
2. (15%) Evaluate  $\int_0^1 \ln x dx$ .
3. (15%) Use the **Integral Test** to determine whether  $\sum_{n=1}^{\infty} \frac{1}{n^2 + 1}$  converges or diverges.
4. (15%) Determine whether the series  $\sum_{n=1}^{\infty} \frac{2n^2 + n}{\sqrt{4n^7 + 3}}$  converges or diverges.
5. (10%) Find  $\int xe^x dx$ .
6. (10%) Find  $\int \frac{1}{(4 + x^2)^{3/2}} dx$ .
7. (10%) Find  $\lim_{n \rightarrow \infty} e^{\sin(1/n)}$ .
8. (5%, 5%) Show that the following series are divergent.

(a)  $\sum_{n=1}^{\infty} (-1)^{n-1}$

(b)  $\sum_{n=1}^{\infty} \frac{2n^2 + 1}{3n^2 - 1}$