

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

a. $\sum_{n=1}^{\infty} (-1)^n \frac{2n}{4n-1}$

b. $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{3n}{4n^2-1}$