

## 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。
3. 沒依題目要求，不予計分。

試題：

1. (15%) Find  $\int \frac{\sqrt{x^2 - 16}}{x} dx$ .
2. (15%) Evaluate the integral:  $\int_2^4 \frac{3x - 5}{(x - 1)^2} dx$
3. (15%) Show that the series  $\sum_{n=1}^{\infty} \frac{4}{4n^2 - 1}$  is convergent, and find the its sum.
4. (15%) Use the Integral Test to determine whether  $\sum_{n=1}^{\infty} \frac{1}{n^2 + 1}$  converges or diverges.
5. (10%) Evaluate  $\int_1^e \ln x dx$ .
6. (10%) Evaluate  $\int_2^4 \frac{1}{\sqrt{4-x}} dx$ .
7. (10%) Show that the series  $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n} + 1}$  is divergent.
8. (10%) Determine whether the series  $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{3n}{4n^2 - 1}$  converges or diverges