

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 $\int (x+1)\sqrt{2x-1} dx$.
2. (15%) Use the **Mean Value Theorem** to prove that $|\sin a - \sin b| \leq |a - b|$ for all real numbers a and b .
3. (5%, 5%, 5%) Find the following values of the function $f(x) = x^3 - 3x^2 - 24x + 32$:
(1) relative maxima; (2) relative minima; (3) inflection points.
4. (15%) Evaluate the limit by interpreting it as the limit of a Riemann sum of a function on the interval $[0, \frac{\pi}{2}]$:

$$\lim_{n \rightarrow \infty} \frac{\pi}{2n} \sum_{k=1}^n \cos\left(\frac{k\pi}{2n}\right)$$

5. (5%,5%) Find the horizontal asymptotes of the graph of the function

$$f(x) = \frac{3x}{\sqrt{x^2 + 1}}$$

6. (10%) Find the extreme values of the function $f(x) = 3x^4 - 4x^3 - 8$ on $[-1, 2]$.
7. (10%) Find the derivative of the function $G(x) = \int_0^{x^2} t \sin t dt$.
8. (10%) Evaluate the integral $\int_0^{\pi/2} \sqrt{\cos \theta} \sin \theta d\theta$.