1. 求导数:
   \[ f'(x) = x^2 \cos x. \]

2. 求积分:
   \[ \int e^x \sin x \, dx. \]
   \[ \int x^2 e^x \, dx. \]

3. 求极限:
   \[ \lim_{x \to 0^+} (e^x + e^{-x} - 2) x^2. \]

4. 求心弦长: \[ r = 1 - \cos \theta. \quad (0 \leq \theta \leq 2\pi) \] 的弦长.

5. 利用凸函数性质证明: \[ a, b \geq 0, \quad \frac{1}{a} + \frac{1}{b} = 1, \quad 7 > 9. \]
   \[ ab \leq \frac{1}{a} a^p + \frac{1}{b} b^q. \]

6. 证明：Riemann 函数可积.

7. \[ f(x) \text{在} [a, b] \text{上可导}, \quad f'(a) > 0, \quad f'(b) < 0. \]
   证明: \[ \exists \xi \in (a, b), \quad \text{使得} \quad f'(\xi) = 0. \]

8. \[ f(x) \text{在区间} I \text{上可导}, \quad \text{证明:} \quad \forall x_0, x \in I. \]
   \[ f(x) \geq f(x_0) + f'(x_0)(x - x_0). \]