

1. 求 $\lim_{x \rightarrow 1} \frac{\sqrt{x+3}-2}{3-\sqrt{x+8}} = ?$ (8 分)

2. 令 $f(x) = \frac{x(x-1)(x-2)(x-3)}{(x+1)(x+2)(x+3)}$ ，求 $\frac{d}{dx} f(x)|_{x=0} = ?$ (8 分)

3. 求 $f(x) = \frac{x^2+1}{x^2-9}$ 之極值 = ? (8 分)

4. $\int_0^{100} \frac{\sqrt[100]{100-x}}{\sqrt[100]{100-x} + \sqrt[100]{x}} dx = ?$ (8 分)

5. $\lim_{x \rightarrow 0} \frac{\sin^{-1} \tan x}{\sin x} = ?$ (8 分)

6. $\int \frac{1}{x\sqrt{9-(\ln x)^2}} dx = ?$ (8 分)

7. $\int x \cos x dx = ?$ (8 分)

8. $\int_0^3 \sqrt{3^2 - x^2} dx = ?$ (8 分)

9. $\lim_{x \rightarrow \infty} \left(\frac{x+2}{x+1} \right)^x = ?$ (8 分)

10. $\int_0^{\infty} x^2 e^{-\frac{x}{2}} dx = ?$ (8 分)

11. 求極大值 $f(x, y) = 100 - x^2 - y^2$ 受限於 $2x - 4y = 20$ (10 分)

12. $\int_0^1 \int_{3y}^3 e^{x^2} dx dy = ?$ (10 分)