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## 國立東華大學招生考試試題 第 1 頁, 共 1 頁

招生學年度	九十九	招生類別	轉學招生考試
系所班別	化學系二年級、材料科學與工程學系二年級、物理學系物理組二年級、物理學系奈米與光電科學組二年級		
科目	微積分		
注意事項	禁止使用掌上型計算機		

- (10%) Find the limit.  
 (a)  $\lim_{x \rightarrow 0} \frac{\sqrt{x+1}-1}{x}$       (b)  $\lim_{x \rightarrow 0} \frac{\tan x}{x}$
- (10%) Find the derivative of  $F(x) = \int_0^{x^3} \sin t^2 dt$ .
- (10%) Find  $\int \frac{x^2+x+1}{x^2+1} dx$ .
- (10%) If  $f(x) = \int_2^x \frac{dt}{\sqrt{1+t^3}}$ , where  $x > -1$ , find  $(f^{-1})'(0)$ .
- (10%) Find  $\int_{-\infty}^{\infty} \frac{e^x}{1+e^{2x}} dx$ .
- (10%) Find  $\frac{dy}{dx}$ , given  $y^3 + y^2 - 5y - x^2 + 4 = 0$ .
- (10%) Find the critical points, the saddle point and the relative extrema of  $f(x, y) = -x^3 + 4xy - 2y^2 + 1$ .
- (10%) Find the maximum and the minimum of  $f(x, y) = 2x^2 + y^2 - 2y + 1$  subject to the constraint  $x^2 + y^2 \leq 4$ .
- (10%) Find  $\int_0^1 \int_y^1 e^{-x^2} dx dy$ .
- (10 %) Let  $R$  be the region bounded by the lines  $x - 2y = 0$ ,  $x - 2y = -4$ ,  $x + y = 4$ , and  $x + y = 1$ . Evaluate the double integral  $\int_R \int 3xy dA$ .