

# 國立嘉義大學九十七學年度轉學生招生考試試題

科目：微積分(管理學院用卷) <請將答案寫在答案卷上>

1. Differentiate the following functions:

A.  $f(x) = 2x^2 + \frac{2}{\sqrt{x}} - \frac{4}{x}$  (6分)

B.  $f(x) = \left(\frac{e^{2x}}{e^{-2x} + 1}\right)$  (6分)

C.  $f(x) = (x^2 + x)^4(2x^2)$  (6分)

D.  $f(x) = \sqrt{2x^2 + 1}$  (6分)

E.  $f(x) = \ln(x^2 + 1)$  (6分)

2. Evaluate the following:

A.  $\lim_{x \rightarrow 1^-} \frac{\sqrt{x} - 1}{x - 1}$  (5分)

B.  $\lim_{x \rightarrow \infty} \frac{3x^2 + 2x + 4}{x^3 + x + 1}$  (5分)

C.  $\int xe^{2x^2} dx$  (5分)

D.  $\int_0^4 x\sqrt{9+x^2} dx$  (5分)

E.  $\int x^3 \ln x dx$  (5分)

F.  $\int_{-\infty}^0 \frac{1}{(x-2)^3} dx$  (5分)

3. Answer the following questions:

A. If a function  $f(x)$  is represented by the power series  $\sum c_k x^k$ , then  $c_k = \underline{\hspace{2cm}}$ . (5分)

B. The Taylor series for a function will represent the function for those  $x$  for which the remainder  $R_n(x)$  in the formula of Taylor satisfies  $\underline{\hspace{2cm}}$ . (5分)

C. The Maclaurin series for  $\sin x$  represents  $\sin x$  for  $\underline{\hspace{1cm}} < x < \underline{\hspace{1cm}}$ . (5分)

D. The first five terms in the Maclaurin series for  $\frac{1-x}{1+x}$  are  $\underline{\hspace{2cm}}$ . (5分)

4. Solve the differential equation  $y''(t) + 6y'(t) + 9y = 27$  under the two initial conditions  $y(0) = 5$  and  $y'(0) = -5$ . (20分)