

元智大學 107 學年度 轉學考 招生試題卷

系(所)別：電機工程學系學
士班 組別：電機工程學系丙組 2 年級 科目：微積分

用紙第 | 頁共 | 頁

●不可使用電子計算機

1. Find the integrals.

(a) $\int \frac{x^3 - x + 3}{x^2 + x - 2} dx$ (10 %); (b) $\int \frac{1}{4 + 4x^2 + x^4} dx$ (10 %)

(c) $\int \sqrt{\tan x} \sec^4 x dx$ (10 %); (d) $\int \frac{3x}{\sqrt{2x+3}} dx$ (10 %)

2. Evaluate the limit, using L'Hôpital's Rule if necessary. (10 %)

$$\lim_{x \rightarrow \infty} \frac{x^3}{e^{x^2}}$$

3. Find the derivatives (10 %)

$$y = x^{\ln x}$$

4. Determine the convergence or divergence of the series. (10 %)

$$\sum_{n=1}^{\infty} \frac{1}{n\sqrt{n^2+1}}$$

5. Use an **iterated integral** to find the area of the region bounded by the equations.

$$y = x^{3/2}, \quad y = 2x \quad (10\%)$$

6. Find the total differential.

$$z = \frac{1}{2} (e^{x^2+y^2} - e^{-x^2-y^2}) \quad (10\%)$$

7. $f(x) = \frac{x+3}{\sqrt{x}}$, Please answer the following question.

- (a) Critical numbers (2%)
- (b) Relative maximum and minimum (2%)
- (c) Concavity (2%)
- (d) Points of inflection (2%)
- (e) Vertical, horizontal and slant asymptotes (if any) (2%)