

國立高雄師範大學 108 學年度學士班轉學生招生考試試題

系所別：數學系及光通系二年級

科 目：微積分

※注意：1.不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上，於本試題上作答者，不予計分。

2.限用藍色或黑色筆作答，以其他顏色作答者不予計分。

1. (30%) True or False:

- (1). A continuous function $f(x)$ is differentiable.
- (2). If a function is differentiable at a point, then it is continuous at that point.
- (3). Let $f(x)$ be a differentiable function. Then $f'(x)$ must be continuous.
- (4). The absolute function $f(x) = |x|$ is continuous at $x=0$.
- (5). The absolute function $f(x) = |x|$ is differentiable at $x=0$.
- (6). $f'(c) = 0$ implies $f(c)$ is an extreme value.

2. (10%) Find the Maclaurin series of e^x .

3. (10%) Find the global maximum and minimum values of $x^2 + y^2 + 2$ on

$$S = \left\{ (x, y) : x^2 + \frac{y^2}{4} \leq 1 \right\}.$$

4. (20%) Evaluate the limits that exist :

(a) $\lim_{x \rightarrow 1} \frac{(1 - \sqrt{x})(1 - \sqrt[3]{x}) \cdots (1 - \sqrt[n]{x})}{(1 - x)^{n-1}}, \quad n \geq 2;$

(b) $\lim_{x \rightarrow 2} \frac{\cos(\pi/x)}{x - 2}$

5. (15%) Evaluate the integral

$$\oint_C \frac{-ydx + xdy}{x^2 + y^2}$$

if C is a piecewise smooth simple closed curve oriented counterclockwise

such that (a) C does not enclose the origin and (b) C encloses the origin.

(背面尚有試題)

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6. (15%) Use the transformation $u = xy$, $v = x^2 - y^2$ to find

$$\iint_R (x^4 - y^4) e^{xy} dA$$

where R is the region in the first quadrant that is enclosed by the hyperbolas $x^2 - y^2 = 1$, $x^2 - y^2 = 4$ and the circles $x^2 + y^2 = 9$, $x^2 + y^2 = 16$.