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

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

(a) $\lim_{x\to 1}\frac{\left(1-\sqrt{x}\right)\left(1-\sqrt[3]{x}\right)\cdots\left(1-\sqrt[n]{x}\right)}{(1-x)^{n-1}}$, $n\ge 2$;

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

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 $x^2 + y^2 = 9,\ x^2 + y^2 = 16$.