

編號： 185、207

國立成功大學106學年度碩士班招生考試試題

系 所：電機工程學系、電機資訊學院-微電、奈米聯招

考試科目：工程數學

考試日期：0213，節次：3

第 / 頁，共 / 頁

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Let $f(x,y) = e^{xy} \sin(x+y)$.

(a) In what direction, starting at $(0, \pi/2)$, is f changing the fastest? (10%)

(b) In what direction, starting at $(0, \pi/2)$, is f changing at 50% of its maximum rate? (10%)

2. In the solution to the problem

$$u_{xx} + u_{yy} = 0 \quad \text{for } 0 < x < \pi/2, y > 0$$

$$u_x(0, y) = 0, \quad u_x(\pi/2, y) = 0$$

$$u(x, 0) = 1 - x, \quad u(x, y) \text{ is bounded as } y \rightarrow \infty$$

find the coefficient on $\cos(6x)e^{-6y}$. (Skip $\lambda < 0$ case) (15%)

3. Evaluate

$$\int_{\gamma} \frac{dz}{e^z - 1}$$

Where γ is the circle $|z| = 9$. (15%)

4. Find the general solution of the following equation: (15%)

$$y' = \frac{y - x}{y + x}$$

5. Solve the following initial value problem: (15%)

$$y'' + 3.7y' = 0, \quad y(-2) = 4, \quad y'(-2) = 0$$

6. Find the radius of convergence of the following series: (20%)

$$\sum_{m=0}^{\infty} \frac{(-1)^m}{5^m} (x - 5)^m$$