

科目：微積分

系所組：金融與國際企業學系暨金融碩士班

1. (10%) Please evaluate  $\int_1^4 \int_1^2 \left(\frac{x}{y} + \frac{y}{x}\right) dy dx$ .
2. (10%) Please evaluate  $\int_0^1 (e^{-x} + \sqrt{x}) dx$
3. (10%) Find  $\lim_{k \rightarrow \infty} \frac{e^k}{k!}$
4. (10%) Find the area of the region enclosed by the line  $y = 4x$  and the curve  $y = x^3 - 3x^2$ .
5. (10%) The position function of a particle is given by  $s = t^3 - 1.5t^2 - 2t$ ,  $t \geq 0$ . When does the particle reach a velocity of 166 m/s?
6. (15%) Please graph the function:  $y = f(x) = \frac{(x+1)^3}{6x^2+2}$ . Please discuss about the extreme values, slopes, concavity, and the inflection points of the function.
7. (10%)  $f(x, y, z) = \sqrt{x^2 + y^2 + z^2}$ , suppose  $f_x(a, b, c) = \frac{\partial}{\partial x} f(a, b, c)$ , find  $f_x(1, 0, 0)$ ?
8. (10%) If  $y = 2x^3 + 6x$  and  $\frac{dx}{dt} = 6$ , find  $\frac{dy}{dt}$  when  $x = 5$ .
9. (5%) Find the Taylor polynomial of  $f(x) = \sqrt[3]{x}$  for the center  $c = 8$  and degree  $n = 2$ .
10. (10%) Let  $f''(x) = 3x^{-0.5} - 10$  and  $f(1) = f'(1) = 3$  then  $f(x) = ?$

※ 注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部份可當稿紙使用。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。