93學年度國立成功大學研究所招生考試　企業管理學系　丁組　微積分　試題　共 2 頁 第 1 頁

選擇題：（每題五分，共六十分。）

1. The perpendicular distance from (1,2) to the line $y = (2x/3) + 1$ is

   A) 26　B)13　C)$\sqrt{13}$　D)$\frac{\sqrt{13}}{13}$　E)$\frac{2}{\sqrt{3}}$

2. If one root of the equation $x^2 + bx - 8 = 0$ is the square root of the other then b = ?

   A) -2　B) -9　C) -6　D) 0　E) 26

3. What is the value of $\lim_{h\to 0}\frac{\sqrt{2+h}+\sqrt{2}}{h}$?

   A) Undefined　B) 0　C)$\frac{\sqrt{2}}{2}$　D)$\frac{\sqrt{2}}{4}$　E) $+\infty$

4. Given $f(x)=\frac{x^2-2x-1}{x-1-\sqrt{2}}$ if $x \neq 1+\sqrt{2}$ and $f(x)$ is continuous at $x = 1+\sqrt{2}$.

   Find $f(1+\sqrt{2})$.

   A)$\frac{1}{2}$　B) 2　C) $2\sqrt{2}$　D) $\sqrt{2}$　E) 0

5. If $f(x) = 5|2x-1| - 2|3x^2-4|$ the $f'(-1) = ?$.

   A) 2　B) 0　C) 22　D) -22　E) -2

6. If $f(x) = x^2$, $h(x) = f(1+g(x))$, $g'(1) = 1$ and $h'(1) = 1$, then $g(1) = ?$

   A) -1　B) $-\frac{1}{2}$　C) 0　D)$\frac{1}{2}$　E) 1

7. Suppose $h(x)=\frac{x^4}{x-\sin x}$ for $x \neq 0$. In order that $h(x)$ be continuous at 0, $h(0)$ = ?

   A) -1　B) 0　C) 1　D) 3　E) 6

8. What is the difference between the maximum and minimum values of the function $f(x) = x + \sin x$ on the closed interval $[\frac{\pi}{6}, \pi]$?

   A) $\frac{\pi}{2}+\sqrt{3}-1$　B) $\frac{5\pi}{6}-1$　C)$\sqrt{3}-\frac{\pi}{3}$　D)$\frac{2\pi}{3}$　E) $\frac{\pi}{2}$

9. Suppose f is a non-negative increasing function on [0,4], $\int_0^4 f(x)dx = 5$, and $\{x \mid f(x) \geq 6\} = [3.5, 4]$. Which of the following are impossible?

   I. $\int_0^{3.5} f(x)dx = 1$　II. $\int_0^{3.5} f(x)dx = 3$　III. $f(2) = 2$

   A) II only　B) I and II only　C) I and III only　D) II and III only　E) I, II and III

（背面仍有題目，請繼續作答）

10. If $F(x)=\int_0^x xf(t)dt$, then what is $xF'(x)$?

A) $x^2 f(x)+F(x)$ B) $f(x)+F(x)$ C) $x\ f(x)+F(x)$
D) $x\ F(x)+f(x)$ E) $x\ f(x)+x\ F(x)$

11. What is the interval of convergence of the series $\sum_{n=0}^{\infty}\frac{(-1)^n x^n}{4^n}$?

A) $0\le x<1$ B) $-1<x<1$ C) $-4\le x\le 4$ D) $-4<x\le 4$ E) $-4<x<4$

12. Which of the following is equal to the sum $S=1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\ldots+(\frac{1}{2})^{10}$?

A) $\frac{2^{10}-1}{2^{10}}$ B) $\frac{2^{11}+1}{2^{10}}$ C) $\frac{2^{10}+1}{2^{10}}$ D) $\frac{2^{11}-1}{2^{10}}$ E) $\frac{2^{11}+1}{2^{10}}$

計算題：（每題十分，共四十分。）

1. What is the area of the closed region bounded by $x=-1$, $x=0$, $y=x^2$ and $y=x^3$?

2. Let the functions f, g, and h be defined as follows:

$$f(x)=\begin{cases} x\sin\frac{1}{x}, & \text{for } -1\le x\le 1 \text{ and } x\ne 0 \\ 0, & \text{for } x=0 \end{cases} \qquad g(x)=\begin{cases} x^2\sin\frac{1}{x}, & \text{for } -1\le x\le 1 \text{ and } x\ne 0 \\ 0, & \text{for } x=0 \end{cases}$$

and $h(x)=|x|^3$ for $-1\le x\le 1$.

Which of these functions are differentiable at 0?

3. $f(x,y)=3y^2\ln(x^3+4)+\frac{2y}{x}$ for $x>0$ and $-\infty<y<\infty$. What value of y minimizes $\frac{\partial f}{\partial x}$ when $x=2$?

4. What are all the values of x for which the infinite series

$$(x-5)+2(x-5)^2+3(x-5)^3+4(x-5)^4+\ldots$$ converges?