

逢甲大學九十四學年度轉學生招生考試試題

科目	微積分	適用系別	二年級(一)組群、(四)組群	時間	八十分鐘
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一、單選題(每題 5 分，答錯不倒扣，合計 50 分)

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(請將答案依序填入答案卷上)

1. The limit, $\lim_{t \rightarrow 0} \frac{\sqrt{t^2 + 9} - 3}{t^2}$, equals

- A. $\frac{1}{3}$ B. $\frac{1}{5}$ C. $\frac{1}{6}$ D. does not exist E. none of these

2. If $f(x) = \begin{cases} x^2 - x - 6 & , x \neq -2 \\ a & , x = -2 \end{cases}$ is continuous at $x = -2$, then a equals

- A. 4 B. -3 C. 3 D. -5 E. none of these

3. If $h(x) = xg(x)$, $g(3) = 5$ and $g'(3) = 2$, then $h'(3)$ equals

- A. 15 B. 13 C. 11 D. 10 E. none of these

4. If $f(x) = \frac{\sqrt{2x^2 + 1}}{3x - 5}$, then

- A. $y = \frac{\sqrt{2}}{3}$ is the only horizontal asymptote of f B. $y = -\frac{\sqrt{2}}{3}$ is a

horizontal asymptote of f C. $y = \frac{\sqrt{2}}{3}$ is not a horizontal asymptote of f

- D. f has no horizontal asymptote E. none of these

5. $\int_2^4 \frac{1}{x\sqrt{x-1}} dx$ equals

- A. 2 B. $\frac{2}{5}$ C. $\frac{\pi}{6}$ D. $\frac{2\pi}{3}$ E. none of these

6. $\int_0^{\pi/8} \cos 3x \cos x dx$ equals

- A. $\frac{1 - \sqrt{2}}{4}$ B. $\frac{1 + \sqrt{2}}{8}$ C. $\frac{1 + \sqrt{2}}{4}$ D. $\frac{1 - \sqrt{2}}{8}$ E. none of these

7. Which of the following series is/are convergent?

(1) $\sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right)$ (2) $\sum_{n=1}^{\infty} \frac{1}{n^{1+\frac{1}{n}}}$ (3) $\sum_{n=1}^{\infty} \frac{n!}{n^n}$

- A. (1) B. (2), (3) C. (1), (3) D. (1), (2), (3) E. none of these

8. $\int_{-1}^1 \frac{\tan x}{1+x^2+x^4} dx$ equals

- A. 0 B. $\frac{\pi}{2}$ C. $\frac{2\pi}{3}$ D. 4 E. none of these

9. The average value of $f(x) = 1 + x^2$ on $[-1, 2]$ is

- A. 2 B. 3 C. 4 D. 6 E. none of these

10. Given that $z = x^2y + 3xy^4$ with $x = \sin 2t$, $y = \cos t$. Then $\left. \frac{dz}{dt} \right|_{t=0}$ equals
- A. 2 B. 4 C. 6 D. 8 E. none of these

二、填充題(不必列出計算過程，每空格 5 分，合計 30 分)

(請將答案依序填入答案卷上)

- An equation of the tangent line to the curve $x^3 + y^3 = 6xy$ at the point, $(3, 3)$, is _____.
- A linear approximation of $f(x) = \sqrt{x+3}$ at $a=1$ is _____.
- $\frac{d}{dx} \left(\int_1^{x^4} \sqrt{\sec t} dt \right) =$ _____.
- An equation of the tangent plane to the surface, $z = 2x^2 + y^2$, at the point, $(1, 1, 3)$, is _____.
- If $x^3 + y^3 + z^3 + 6xyz = 1$, then $\frac{\partial z}{\partial x} =$ _____.
- $\lim_{x \rightarrow 0^+} (1 + \sin 4x)^{\cot x} =$ _____.

三、計算題(請務必寫出計算過程，每題 10 分，合計 20 分)

(請在答案卷上標明題號作答)

- Find the directional derivative of $f(x, y) = x^2y^3 - 4y$ at $(2, -1)$ in the direction of $v = 3i + 4j$.
- Compute $\iint_D xe^{y^2} dA$, where D is the region bounded by $x = \sqrt{y}$, $y = 4$ and y -axis.