

義守大學九十二學年度轉學生入學招生考試
『微積分』參考試題

◎注意：不可使用計算機

壹：單選題：(每題 5 分；不需要寫出演算過程)

1. Find the limit of $\lim_{x \rightarrow 0} \frac{\sin^2 x}{x} = ?$ (a) 0 (b) -1 (c) 1 (d) does not exist

2. What is the slope of the tangent line to the graph of $x^2 + y^2 = 1$ at the point $(1/\sqrt{2}, 1/\sqrt{2})$?
 (a) -2 (b) -1 (c) 1 (d) 2

3. Let $f(x) = (3x^2 - 2)^3$, then $f'(x) = ?$
 (a) $18x(3x^2 - 2)^2$ (b) $3(3x^2 - 2)^2$ (c) $6x^2(3x^2 - 2)^2$ (d) $9(3x^2 - 2)^2$

4. Find the area of the region bounded by the graph $x = 3 - y^2$ and $x = y + 1$
 (a) $11/2$ (b) $9/2$ (c) $7/2$ (d) $5/2$

5. $\int_0^2 \int_0^x (x + y) dy dx = ?$ (a) 0 (b) 2 (c) 4 (d) 6

6. Find the derivative of $F(x) = \int_0^{x^2} \sqrt{t^2 + 1} dt = ?$
 (a) $2x\sqrt{x^4 + 1}$ (b) $\sqrt{x^4 + 1}$ (c) $\frac{2}{3}(x^4 + 1)^{3/2}$ (d) $x^2\sqrt{x^4 + 1}$

7. Find the volume of the solid formed by revolving the region bounded by the graphs of $y = x^2 + 1$, $y = 0$, and $x = 0$?

(a) $\frac{1}{2}\pi$ (b) $\frac{3}{2}\pi$ (c) $\frac{5}{2}\pi$ (d) $\frac{7}{2}\pi$

8. What is the largest value of the direction derivative of $D_u f$ at the point $P(2,1)$, given the function $f(x,y) = xe^{2y-x}$

(a) $\sqrt{13}$ (b) $3\sqrt{2}$ (c) $\sqrt{17}$ (d) $4\sqrt{3}$

9. $\int_{-1}^1 \frac{1}{x^2} dx = ?$ (a) -2 (b) 0 (c) -1 (d) does not exist

10. Evaluate $\int_0^1 xe^x dx = ?$ (a) 1 (b) 2 (c) 3 (d) 4

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貳：填空題：(每題 6 分；不需要寫出演算過程)

1. Let $z = 4x - y^2$, where $x = uv^2$ and $y = u^2v$.

Find $\frac{\partial z}{\partial u} = \underline{\hspace{2cm}}$ (答案以 u 和 v 表示之)

2. $\int_{-3}^3 (x^3 + \sin x + x) dx = \underline{\hspace{2cm}}$

3. Evaluate $\iint_D (x^2 + y^2) dA = \underline{\hspace{2cm}}$, where D is the region inside the circle $x^2 + y^2 = 4$.

4. Find the interval convergence of the power series $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{(x+1)^n}{n}$. $\underline{\hspace{2cm}}$

5. Let $f(x) = e^{5x^2} + \cos(2x^2 + 1)$, then $f'(x) = \underline{\hspace{2cm}}$

參：計算題：(每題 10 分；需要寫出演算過程，只寫答案不予計分)

1. Minimize $f(x, y) = 4x^2 + 9y^2$, subject to $2x + 3y = 6$.

Given $f(x) = 5 - \frac{4}{x}$, find all values of c in the open interval $(2, 4)$ such that $f'(c) = \frac{f(4) - f(2)}{4 - 2}$. (hint: Mean Value Theorem)