國立聯合大學 104 學年度碩士班考試招生

環境與安全衛生工程系　　入學考試試題

科　目：　　微積分　　　　　　　　第　1　頁共　1　頁

計算下列各題(答案必須化為最簡型式)：每題5%

(1) if $z = x^2 + xy^3$, $x = \sin(st)$, $y = \cos(s+t)$, then $\frac{\partial z}{\partial t} =?$

(2) If $f(x) = \sqrt[4]{x^3 + 3x + 2}$, find $f(1)' =?$

(3) $y(x) = (3x^4 + 1)(2x^2 - 5x)$, then $y' =?$

(4) $f(x) = \sqrt{\cos\sqrt{x}}$, then $f'(x) =?$

(5) If $F(x) = \ln|x^3 + 3x + 2|$, find $F(2)' =?$

(6) $f(x) = \frac{-x^2 + 3x}{4x - 1}$, then $f'(x) =?$

(7) If $g(x) = x\sin^{-1}x + \sqrt{1 - x^2}$, then $g'(x) =?$

(8) If $f(x) = e^{\tan x}$, then $f'(x) = ?$

(9) $y = 4u^2 + 1$, $u = 3v^5 + 2$, $v = 6w + 4$, then $\frac{dy}{dw} =?$

(10) The derivative of a function f is shown in the Figure:
  (A) At what values of x does f (x) have a local minimum value?
  (B) (續上題) On what intervals is f (x) concave upward?
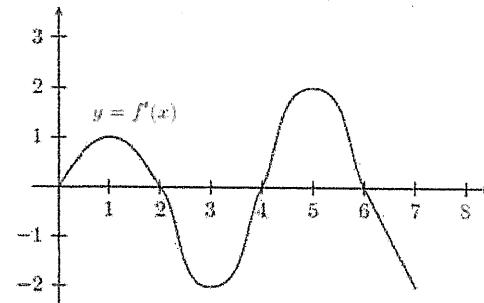
(11) Find $\int_0^1 \frac{4x^3 + 3x^2 + 2x}{x^4 + x^3 + x^2 + 1} dx = ?$

(12) $\int \frac{x^2}{\sqrt{x+1}} dx = x^2 \cdot f(x) - \int 2x \cdot g(x) dx$, Use integration by parts to determine f(x) and g(x).

(13) Find $\int x\, e^{-x^2} dx = ?$

(14) (5%) Which of the following statements is correct? $\int_0^3 \int_{y^2}^9 y\sin(x^2)\,dxdy =$

  (A) $\int_{y^2}^9 \int_0^3 y\sin(x^2)\,dydx$　(B) $\int_{y^2}^9 \int_0^3 x\sin(y^2)\,dydx$　(C) $\int_0^3 \int_0^{x^2} y\sin(x^2)\,dydx$　(D) $\int_0^9 \int_0^{\sqrt{x}} y\sin(x^2)\,dydx$

(15) Find the equation of the tangent to the curve $x = 1 + \ln t$, $y = t^2 + 2$ at the given point $(1, 3)$.

(16) Find $\int (1 - 2x)^9 dx =?$

(17) Find $\int_1^4 r^{\frac{3}{2}} \ln r\, dr = ?$

(18) Find $\int e^{2\theta} \sin(3\theta)\,d\theta = ?$

(19) Evaluate $\iint_D xy\,dA$ where D is enclosed by the curves $y = x^2 - 1$ and $y = 3x$.

(20) Which of the following statements is not correct?

  (A) $\lim_{x \to 1} \frac{\ln x}{x - 1} = \lim_{x \to 1} \frac{1/x}{1}$　(B) $\lim_{x \to \infty} \frac{e^x}{x^2} = \lim_{x \to \infty} \frac{e^x}{2x}$　(C) $\lim_{x \to \infty} \frac{\ln x}{\sqrt{x}} = \lim_{x \to \infty} \frac{1/x}{\frac{1}{2}x^{-1/2}}$　(D) $\lim_{x \to \pi^-} \frac{\sin x}{1 - \cos x} = \lim_{x \to \pi^-} \frac{\cos x}{\sin x}$