

國立聯合大學 106 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

一、單選題(每題5分)

1. If f and g are the functions which are shown in Figure 1. Evaluate $f(2)+g(5)=?$ (A) 6 (B) 2 (C) 0 (D) -2 (E) -6

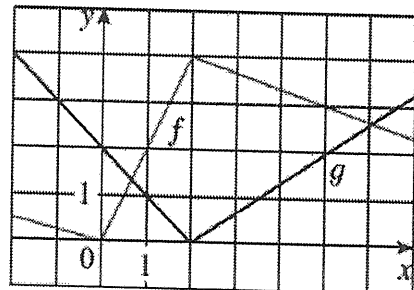


Figure 1

2. (續上題) let $u(x) = g(x)/f(x)$, find $u(1)'=?$ (A) 1 (B) -1 (C) 0 (D) $-\frac{1}{2}$ (E) $-\frac{1}{4}$

3. (續上題) let $u(x) = f(x)g(x)$, find $u(1)'=?$ (A) 4 (B) 2 (C) 0 (D) -2 (E) -4

4. (續上題) At what value of x does $f(x)$ have a local maximum value?

(A) $x = -2$ (B) $x = 0$ (C) $x = 1$ (D) $x = 2$ (E) $x = 7$

5. (續上題) Evaluate $\int_{-2}^5 g(x)dx=?$ (A) 3 (B) 17 (C) 4 (D) -4 (E) 11

6. (續上題) Evaluate $\int_0^5 [f(x) - g(x)]dx=?$ (A) $13\frac{1}{3}$ (B) $3\frac{1}{3}$ (C) $-\frac{1}{3}$ (D) $-6\frac{1}{3}$ (E) $8\frac{1}{3}$

7. The graph of the derivative of a function f is shown in the Figure 2. At what values of x does f may have a local minimum or maximum value? (A) 3 (B) 5 (C) 7 (D) -2 (E) -1

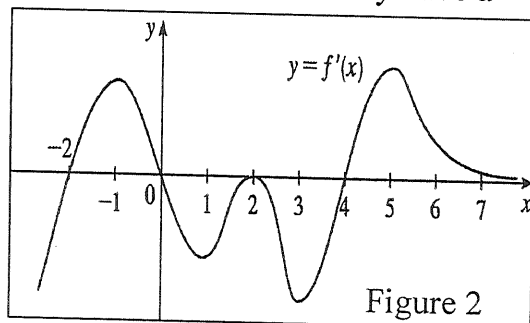


Figure 2

8. (續上題) At what values of x does f have a local minimum value?

(A) 0 and 7 (B) 2 and 5 (C) -2 and 4 (D) 1 and 3 (E) -1 and 5

9. If $y = 2\pi^2$, find $y'=?$ (A) $4\pi^2$ (B) 0 (C) 4π (D) 2π (E) π^2

10. If $f(x) = e^{\cos x}$, then $f'(x) = ?$

(A) $e^{\sin x}$ (B) $e^{-\sin x}$ (C) $e^{\cos x - 1}$ (D) $-\sin x e^{\cos x - 1}$ (E) $-\sin x e^{\cos x}$

11. If $y = x^{99} + \sqrt[99]{x}$, find $\frac{dy}{dx} = ?$

(A) $99x^{98} + \frac{1}{99\sqrt[99]{x^{98}}}$ (B) $-99x^{98} - \frac{1}{99\sqrt[99]{x^{98}}}$ (C) $99x^{100} + 99\frac{1}{\sqrt[99]{x}}$ (D) $\frac{1}{101\sqrt[99]{x^{98}}} - \frac{1}{99x^{98}}$ (E) $\frac{100}{99\sqrt[99]{x}} - \frac{99}{x^{100}}$

12. If $f(x) = \tan(\sin x)$, then $f'(x) = ?$

(A) $\sec x \tan x \cos x$ (B) $\tan^2(\sin x) \cos x$ (C) $\tan(\sin x) \sin(\cos x)$ (D) $\sec^2(\sin x) \cos x$ (E) $\sec(\tan(\cos x))$

13. If $F(x) = \sqrt[4]{x^3 + 3x + 2}$, find $F(2)' = ?$ (A) $\frac{15}{16}$ (B) $\frac{17}{32}$ (C) $\frac{15}{32}$ (D) $\frac{21}{16}$ (E) $\frac{1}{4}$ (16)⁻³

14. If $F(x) = \ln|x^3 + 3x + 2|$, find $F(2)' = ?$ (A) $\frac{15}{2}$ (B) $\frac{\ln(15)}{2}$ (C) $\frac{15}{16}$ (D) $15 \ln 16$ (E) $\frac{16}{15}$

15. Convert the integral $\int_{-3}^3 \int_0^{\sqrt{9-x^2}} \sin(x^2 + y^2) dy dx$ to polar coordinates. (A) $\int_0^\pi \int_{-3}^3 r \sin r^2 dr d\theta$

(B) $\int_0^\pi \int_0^3 r^2 \sin r^2 dr d\theta$ (C) $\int_0^{2\pi} \int_0^3 r \sin r^2 dr d\theta$ (D) $\int_0^\pi \int_0^3 r \sin r^2 dr d\theta$ (E) $\int_0^\pi \int_0^1 3r \sin r^2 dr d\theta$

16. Let $u = x - 1$ and suppose $\int_1^2 \sqrt{x-1} dx = \int_a^b \sqrt{u} du$ Choose the true statment.

(A) $a = 0, b = 2$ (B) $a = -1, b = 0$ (C) $a = 2, b = 3$ (D) $a = 2, b = 4$ (E) $a = 0, b = 1$

請判別題17~題20所敘述的正誤，正確請寫(A)，錯誤請寫(B)：

The graph of a function f is shown in Figure 3.

17. $\lim_{x \rightarrow 0^+} f(x)$ does not exist 19. $\lim_{x \rightarrow 2^+} f(x)$ does not exist

18. $\lim_{x \rightarrow 2} f(x) = \frac{1}{2}$ 20. $f(2) = \frac{1}{2}$

二、計算下列各題(答案必須化為最簡型式)：(每題20分)

1. $\int t^6 \cos 3t dt = ?$

2. $\int \frac{x^3 - 4x - 10}{x^2 - x - 6} dx = ?$

3. $u = \sqrt{r^2 + s^2}, r = y + x \cos t, s = x + y \sin t$, find (a) $\frac{\partial u}{\partial x}$ (b) $\frac{\partial u}{\partial y}$ (c) $\frac{\partial u}{\partial t}$

4. Find the derivative of the function : (a) $y = \frac{(2-e^{3x})^5}{(x+3)^7}$ (b) $y = \sin^2(\ln x^2)$

5. $\int_0^1 \frac{r^3}{\sqrt{4+r^2}} dr$

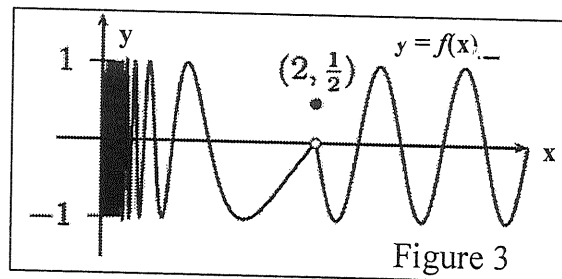


Figure 3