4.1 Maximum and Minimum Values

單選題

1. Let $\boldsymbol{f(x) = x^3 + ax^2 + bx + c}$. If $\boldsymbol{f}$ has local extrema at $\boldsymbol{x = -2}$ and $\boldsymbol{x = 1}$, then which one of the following must be **True**.

   (A) $a + b = \frac{15}{2}$;

   (B) $\boldsymbol{a + b = -\frac{9}{2}}$;

   (C) $\boldsymbol{a + b + c = -1}$;

   (D) $4a - 2b + c = 8$.

Ans: B [104 學年度]

2. Let $\boldsymbol{g(x) = xe^x}$. Then the absolute maximum value of $\boldsymbol{g(\sin x + 2\cos x)}$, $\boldsymbol{x \in \mathbf{R}}$, is

   (A) $\sqrt{3}e^{\sqrt{3}}$; (B) $\sqrt{5}e^{\sqrt{5}}$; (C) $-\boldsymbol{\frac{1}{e}}$; (D) $-\boldsymbol{\frac{3}{e}}$.

Ans: B [104 學年度]

3. Let $\boldsymbol{f(x) = x^3 + ax^2 + bx + c}$. If $\boldsymbol{f}$ has local extrema at $\boldsymbol{x = -2}$ and $\boldsymbol{x = 1}$, then which one of the following must be **True**.

   (B) $a + b = \frac{15}{2}$;

   (B) $\boldsymbol{a + b = -\frac{9}{2}}$;

   (C) $\boldsymbol{a + b + c = -1}$;

   (D) $4a - 2b + c = 8$.

Ans: B [104 學年度]

4. Let f be a continuous function on $[1,4]$ and $\int_1^4 f(x)\,dx = 10$.

   Which of the following statements is **always true** ?

   (A) The average value of f on the interval $[1,4]$ is equal to 3;

   (B) The maximum value of f on the interval $[1,4]$ is less than 4;

   (C) The minimum value of f on the interval $[1,4]$ is greater than 0;

   (D) The maximum value of f on the interval $[1,4]$ is greater than 3.

Ans: D [102 學年度]

多選題

1. Which of the following statements are WRONG for the real function $f(x)$ on (a,b)?

(A) If $f'(c)=0$ for some point $c\in(a,b)$, then $f(x)$ has a local extrema at $x=c$.

(B) If $f(x)$ is continuous on (a,b), then $f(x)$ must have an absolute minimum on (a,b).

(C) If $f''(x)$ exists on (a,b), then $f'(x)$ is continuous on (a,b).

(D) If $f^2(x)$ is differentiable on (a,b), then $f(x)$ must be differentiable on (a,b).

Ans: ABD [99 學年度]