※Single Choice (1~15, 5% each)（每題恰有一解,答對得 5 分,答錯或不答得 0 分）

1. Find the domain of the function $f(x)=\sqrt{1-x^2}$.

Select the correct answer.

(A) $(0,1)$ (B) $[0,1]$ (C) $(-1,1)$ (D) $[-1,1]$ (E) none of above.

2. Find the range of the function $f(x)=\sqrt{1-x^2}$.

Select the correct answer.

(A) $(0,1)$ (B) $[0,1]$ (C) $(-1,1)$ (D) $[-1,1]$ (E) none of above.

3. Find the limit, $\lim_{x\to\infty}\sin x=?$

Select the correct answer.

(A) 0 (B) 1 (C) -1 (D) ∞ (E) does not exist.

4. Find the limit, $\lim_{x\to 0}\dfrac{\sqrt{x^2+1}-1}{x^2}=?$

Select the correct answer.

(A) 0 (B) 1 (C) 2 (D) $\dfrac{1}{2}$ (E) does not exist.

5. Find the limit, $\lim_{x\to-\infty}\dfrac{x}{\sqrt{x^2+x}}=?$

Select the correct answer.

(A) 0 (B) 1 (C) -1 (D) 2 (E) none of above.

6. Let $f(x)=\begin{cases}1 & , x\ge 0\\ -1 & , x<0\end{cases}$. Find the limit, $\lim_{x\to 0}f(x)=?$

Select the correct answer.

(A) 0 (B) 1 (C) -1 (D) does not exist (E) none of above.

7. Let $f(x)=\begin{cases}1 & , x\ge 0\\ -1 & , x<0\end{cases}$. Find the point where $f(x)$ is not continuous.

Select the correct answer.

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

8. Let $f(x)=\begin{cases} 1 & , \quad x \le -1 \\ ax+b & , \quad -1 < x < 3 \\ -1 & , \quad 3 \le x \end{cases}$. If $f(x)$ is continuous on $(-\infty, \infty)$, then $a+b=?$

Select the correct answer.

(A) 1 (B) 2 (C) 3 (D) 4 (E) none of above.

9. If $f(x)=x^2-8x+9$, then $f'(a)=?$

Select the correct answer.

(A) x^2-8x+9 (B) $2x-8$ (C) a^2-8a+9 (D) $2a-8$ (E) none of above.

10. Find $\frac{d}{dx}(x \sin x)=?$

Select the correct answer.

(A) $\sin x$ (B) $\cos x$ (C) $x \sin x$ (D) $x \cos x$ (E) none of above.

11. Find $\frac{d}{dx}\left(\frac{\sin x}{x}\right)=?$

Select the correct answer.

(A) $\frac{\cos x}{x}$ (B) $\frac{x \cos x - \sin x}{x^2}$ (C) $\frac{x \sin x - \cos x}{x^2}$ (D) $\frac{\cos x}{x^2}$ (E) none of above.

12. Find $\frac{d}{dx}(\sin(\sin x))=?$

Select the correct answer.

(A) $\cos(\cos x)$ (B) $\cos(\sin x)$ (C) $\sin x \cos(\sin x)$ (D) $\cos x \cos(\sin x)$

(E) none of above.

13. Find $\int_0^{2\pi} \sin x \, dx = ?$

Select the correct answer.

(A) 0 (B) 1 (C) 2 (D) 4 (E) none of above.

14. Find $\int_0^{2\pi} |\sin x| \, dx = ?$

Select the correct answer.

(A) 0 (B) 1 (C) 2 (D) 4 (E) none of above.

15. Find $\int_0^{\infty} \sin x \, dx = ?$

Select the correct answer.

(A) 0 (B) 1 (C) 2 (D) 4 (E) none of above.

※Multiple Choice(16~20, 5% each)(每題至少有二正確選項, 完全答對得5分, 其餘情形得0分)

16. Let $f(x) > 0$ and $g(x) > 0$ for $x \in \Re$.

Select the correct statements.

(A) $f(x) + g(x) > 0$ for $x \in \Re$.

(B) $f(x) - g(x) > 0$ for $x \in \Re$.

(C) $f(x)\, g(x) > 0$ for $x \in \Re$.

(D) $\dfrac{f(x)}{g(x)} > 0$ for $x \in \Re$.

(E) $f(g(x)) > 0$ for $x \in \Re$.

17. Let $f(x)$ and $g(x)$ be two continuous functions on $\Re$.

Select the correct statements.

(A) $f(x) + g(x)$ is continuous on $\Re$.

(B) $f(x) - g(x)$ is continuous on $\Re$.

(C) $f(x)\, g(x)$ is continuous on $\Re$.

(D) $\dfrac{f(x)}{g(x)}$ is continuous on $\Re$.

(E) $f(g(x))$ is continuous on $\Re$.

18. It is known that $\dfrac{d}{dx}(\ln x) = \dfrac{1}{x}$ for $x > 0$.

Select the correct statements.

(A) $\dfrac{d}{dx}\left(\ln|x|\right) = \dfrac{1}{x}$ for $x < 0$.

(B) $\dfrac{d}{dx}\left(\ln|x|\right) = -\dfrac{1}{x}$ for $x < 0$.

(C) $\dfrac{d}{dx}\left(\ln(2x)\right) = \dfrac{1}{x}$ for $x > 0$.

(D) $\dfrac{d}{dx}\left(\ln(2x)\right) = \dfrac{1}{2x}$ for $x > 0$.

(E) $\int \dfrac{1}{x} dx = \ln|x| + C$

19. Let $f(x)$ and $g(x)$ be two integrable functions with $f(x) > g(x)$, $x \in \Re$.
Select the correct statements.

(A) $\int_1^2 f(x) + g(x)\ dx > 0$

(B) $\int_1^2 f(x) - g(x)\ dx > 0$

(C) $\int_1^2 f(x)\, g(x)\ dx > 0$

(D) $f^2(x) > g^2(x)$ for $x \in \Re$.

(E) $f^3(x) > g^3(x)$ for $x \in \Re$

20. Consider the function $f(x) = x\, e^{-x}, x \in \Re$.
Select the correct statements.

(A) $f(x)$ is continuous on $\Re$.

(B) $\lim_{x \to \infty} f(x) = 0$

(C) $\lim_{x \to -\infty} f(x) = \infty$

(D) $\frac{d}{dx}(x\, e^{-x}) = e^{-x} - x\, e^{-x}$

(E) $\int x\, e^{-x} dx = e^{-x} - x\, e^{-x} + C$.

ANSWER

1	2	3	4	5	6	7	8	9	10
D	B	E	D	C	D	A	C	D	E

11	12	13	14	15
B	D	A	D	E

16	17	18	19	20
A, C, D, E	A, B, C, E	A, C, E	B, E	A, B, D