1~15:單選題(75%)（每題恰有一正確選項,答對一題得五分,答錯或不答時,不倒扣也不給分）

1. What is the domain of $f(x)=\sqrt{\frac{1}{x}}$?

Select the correct answer.

(A) $(-\infty,\infty)$ (B) $(0,\infty)$ (C) $[0,\infty)$ (D) $(-\infty,0)$ (E) $(-\infty,0]$.

2. What is the range of $f(x)=\sqrt{\frac{1}{x}}$?

Select the correct answer.

(A) $(-\infty,\infty)$ (B) $(0,\infty)$ (C) $[0,\infty)$ (D) $(-\infty,0)$ (E) $(-\infty,0]$.

3. $\lim_{x\to -4}\dfrac{0.5+\frac{2}{x}}{x+4}=?$

(A) $-\frac{1}{2}$ (B) $-\frac{1}{4}$ (C) $-\frac{1}{6}$ (D) $-\frac{1}{8}$ (E) $-\frac{1}{16}$.

4. $\lim_{x\to -\infty} x^2e^x=?$

(A) 0 (B) 1 (C) ∞ (D) $-\infty$ (E) none of above.

5. Consider the function $f(x)=\begin{cases} x^2 & , x\le 2 \\ x+C & , x>2 \end{cases}$. Find the value of C so that $f(x)$ is continuous on $\Re$.

(A) 0 (B) 1 (C) 2 (D) 3 (E) none of above.

6. $\frac{d}{dx}\cos(x^2)=?$

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

7. Find y' if $y=\ln(x^2+y^2)$

(A) $\dfrac{-x}{x^2+y^2-2y}$ (B) $\dfrac{-2x}{x^2+y^2-2y}$ (C) $\dfrac{2x}{x^2+y^2-2y}$ (D) $\dfrac{x}{x^2+y^2-2y}$

(E) none of above.

8. Find the absolute maximum value of the function $f(x)=\sqrt{x}-\frac{1}{3}x$ on $0\le x\le 9$.

(A) 0 (B) $\frac{4}{9}$ (C) $\frac{3}{4}$ (D) $\frac{3}{2}$ (E) none of above

9. $\int_1^4 \frac{x^2+6}{\sqrt{x}}\,dx = ?$

(A) 24.4 (B) 37 (C) 74 (D) 49.2 (E) 21.4 .

10. $\int_0^1 3x^2\cos(x^3)\,dx = ?$

(A) $\sin(0.1)$ (B) $3\sin(0.1)$ (C) $3\sin 1$ (D) $\cos 1$ (E) none of above.

11. $\int_1^2 x\sqrt{x-1}\,dx = ?$

(A) $\frac{16}{15}$ (B) $\frac{15}{16}$ (C) $\frac{2}{3}$ (D) $\frac{3}{2}$ (E) none of above.

12. Find the area enclosed by the given curves $y = 5x - x^2$ and $y = x$

(A) $\frac{32}{3}$ (B) $\frac{64}{3}$ (C) 32 (D) 64 (E) none of above.

13. $\frac{d}{dx}(\int_0^x f(t)\,dt)^2 = ?$.

(A) $2f(x)\int_0^x f(t)dt$ (B) $2x\int_0^x f(t)dt$ (C) $2xf(x)$ (D) $f^2(x)$ (E) none of above.

14. Which of the following functions has the property $\int_{-a}^{a} f(x)\,dx = 0$?

(A) $f(x)=\cos x$ (B) $f(x)=\frac{\sin x}{1+x^2+x^4}$ (C) $f(x)=x^2$ (D) $f(x)=|x|$ (E) none of above.

15. Let $f(x)$ and $g(x)$ be two differentiable functions on $\Re$. Consider the following two statements:

(1) If $f(x)=g(x)$ on $\Re$, then $f'(x)=g'(x)$ on $\Re$.

(2) If $f'(x)=g'(x)$ on $\Re$, then $f(x)=g(x)$ on $\Re$.

Select the correct answer.

(A) Both (1) and (2) are correct.

(B) (1) is correct, but (2) is incorrect.

(C) (2) is correct, but (1) is incorrect.

(D) Neither (1) nor (2) is correct.

16~20：複選題(25%)（每題至少有二個正確選項, 完全答對得五分, 其餘情形得 0 分）

16. Let $f(x)=\dfrac{5x+4}{x^2+3x+2}$, which of the following statements are correct?

(A) The domain of $f(x)$ is $(-\infty,\infty)$.

(B) $f(0)=2$.

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

(D) The range of $f(x)$ is $(-\infty,\infty)$.

17. Which of the following statements are correct?

(A) $f(x)=x^5+x$ is an odd function.

(B) $f(x)=1-x^4$ is an even function.

(C) $f(x)=\dfrac{x^2}{x^4+1}$ is an even function.

(D) $f(x)=\dfrac{x}{x^4+1}$ is an odd function.

18. Consider the function $f(x)=x^3-12x+1$. Select the correct statements.

(A) $f(x)$ is decreasing on $(-2,\ 2)$.

(B) $f(x)$ is increasing on $(2,\ \infty)$..

(C) $f(x)$ is decreasing on $(-\infty,\ 2)$..

(D) $f(-2)=17$ is a local maximum.

19. If $\dfrac{5x^2+3x-2}{x^3+2x^2}=\dfrac{A}{x}+\dfrac{B}{x^2}+\dfrac{C}{x+2}$, select the correct answers.

(A) A = 2 .

(B) B = 1 .

(C) C = 3 .

(D) A + B + C = 4 .

20. Which of the following statements are correct?

(A) If a function $f(x)$ is continuous at $x=a$, then $\lim\limits_{x\to a} f(x)$ exists.

(B) If a function $f(x)$ is differentiable at $x=a$, then $f(x)$ is continuous at $x=a$.

(C) If a function $f(x)$ is continuous on [a, b], then $\int_a^b f(x)\,dx$ exists.

(D) If $\int_{-\infty}^{\infty} f(x)\,dx$ exists, then $\int_0^{\infty} f(x)\,dx$ exists.

ANSWER

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

11	12	13	14	15
A	A	A	B	B

16	17	18	19	20
(B, D)	(A,B,C,D)	(A, B, D)	(A,C,D)	(A,B,C,D)