東吳大學 104 學年度轉學生(含進修學士班轉學生)招生考試試題

系級	經濟學系二年級	考試時間	100 分鐘
科目	微積分	本科總分	100 分

單選題，每題 5 分，請<u>按順序標明題號並將答案寫在答案紙上</u>，不需計算過程。

1. $\lim_{x\to 0}\dfrac{\sqrt{x+11}-\sqrt{11}}{x}=$

(A) $\sqrt{11}$ **(B)** $\dfrac{\sqrt{11}}{11}$ **(C)** $\dfrac{\sqrt{11}}{22}$ **(D)** The limit does not exist. **(E)** None of these

2. Find the equation of the line tangent to the graph of $f(x)=\dfrac{x+1}{\sqrt{2x-3}}$ at $(2,3)$.

(A) $y=-4x+7$ **(B)** $y=4x+7$ **(C)** $y=2x+7$ **(D)** $y=-2x+7$ **(E)** None of these

3. For $x^2+y^2=xy+7$, use implicit differentiation to find $\dfrac{dy}{dx}$.

(A) $\dfrac{dy}{dx}=\dfrac{y-2x}{2y-x}$ **(B)** $\dfrac{dy}{dx}=\dfrac{-y+2x}{2y-x}$ **(C)** $\dfrac{dy}{dx}=\dfrac{y+2x}{2y-x}$ **(D)** $\dfrac{dy}{dx}=\dfrac{-y-2x}{2y-x}$ **(E)** None of these

4. Find all relative extrema of the function $f(x)=\dfrac{-1}{x^2-2x+3}$.

(A) Relative maximum: $\left(1,-\dfrac{1}{2}\right)$ **(B)** Relative maximum: $\left(-1,-\dfrac{1}{4}\right)$

(C) Relative minimum: $\left(-1,-\dfrac{1}{4}\right)$ **(D)** Relative minimum: $\left(1,-\dfrac{1}{2}\right)$ **(E)** None of these

5. Find all slant asymptotes of the function $f(x)=\dfrac{2x^3+x^2+2x-1}{x^2+1}$.

(A) $y=2x-1$ **(B)** $y=2x+1$ **(C)** $y=2x$ **(D)** The function has no slant asymptote.
(E) None of these

6. Find any points of inflection for the graph of $f(x)=-x^3+3x^2-2x+3$.

(A) $(-1,9)$ **(B)** $(0,3)$ **(C)** $(1,3)$ **(D)** The graph has no inflection points. **(E)** None of these

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7. If $f(x)=\log_2(x^2-1)$，then $f'(2)=$

(A) $\frac{4}{3\ln 2}$ **(B)** $\frac{4\ln 2}{3}$ **(C)** $\frac{3}{\ln 2}$ **(D)** $\frac{1}{3\ln 2}$ **(E)** $\frac{4}{\ln 2}$ **(F)** None of these

8. If $f(x)=x^{2x}$，then $f'(2)=$

(A) $64(1+\ln 2)$ **(B)** $32(1+\ln 2)$ **(C)** $16(1+\ln 2)$ **(D)** $8(1+\ln 2)$ **(E)** None of these

9. Suppose $F(x)$ is an antiderivative of $\frac{3}{\sqrt{x}}$ and $F(0)=1$. What is $F(9)$?

(A) 1 **(B)** 2 **(C)** $\frac{17}{18}$ **(D)** 19 **(E)** 21 **(F)** None of these

10. $\int_0^1 \frac{x^3+1}{\sqrt{x^4+4x+4}}\,dx=$

(A) $\frac{1}{4}$ **(B)** $\frac{1}{2}$ **(C)** $\frac{1}{3}$ **(D)** $\frac{2}{9}$ **(E)** None of these

11. $\int_1^4 (2-|x-3|)\,dx=$

(A) $\frac{5}{2}$ **(B)** $\frac{7}{2}$ **(C)** $\frac{11}{2}$ **(D)** $\frac{13}{2}$ **(E)** None of these

12. Find the average value of $f(x)=\frac{1}{(x-4)^2}$ from $x=0$ to $x=3$. This answer is

(A) $\frac{1}{2}$ **(B)** $\frac{1}{3}$ **(C)** $\frac{1}{4}$ **(D)** $\frac{1}{6}$ **(E)** None of these

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13. What is the area between the curves $y = 12 - 3x^2$ and $y = 4x + 5$ from $x = 0$ to $x = 4$?

(A) 70 **(B)** 72 **(C)** 74 **(D)** 76 **(E)** None of these

14. $\int_1^2 x^3 \ln x \, dx =$

(A) $4\ln 2 + \frac{15}{16}$ **(B)** $4\ln 2 - \frac{15}{16}$ **(C)** $8\ln 2 + \frac{7}{8}$ **(D)** $8\ln 2 - \frac{7}{8}$ **(E)** None of these

15. $\int_2^3 \frac{x^4 - 4}{x^2 - 1} dx =$

(A) $\frac{22}{3} + \frac{3}{2}\ln\left(\frac{2}{3}\right)$ **(B)** $\frac{22}{3} + \frac{3}{2}\ln\left(\frac{3}{2}\right)$ **(C)** $\frac{22}{3} + \frac{3}{2}\ln\left(\frac{5}{3}\right)$ **(D)** $\frac{22}{3} + \frac{3}{2}\ln\left(\frac{3}{5}\right)$

(E) None of these

16. Find the relative extrema and saddle points of the function $f(x, y) = xy - \frac{1}{4}x^4 - \frac{1}{4}y^4$.

(A) Relative maximum at $\left(-1, -1, \frac{1}{2}\right)$ and $\left(1, 1, \frac{1}{2}\right)$.

Saddle point at $(0, 0, 0)$.

(B) Relative minimum at $\left(-1, -1, \frac{1}{2}\right)$ and $\left(1, 1, \frac{1}{2}\right)$.

Saddle point at $(0, 0, 0)$.

(C) Relative maximum at $(0, 0, 0)$.

Saddle point at $\left(-1, -1, \frac{1}{2}\right)$ and $\left(1, 1, \frac{1}{2}\right)$.

(D) Relative minimum at $(0, 0, 0)$.

Saddle point at $\left(-1, -1, \frac{1}{2}\right)$ and $\left(1, 1, \frac{1}{2}\right)$.

(E) None of these

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17. Find the minimum value of $f(x, y, z, w) = x^2 + y^2 + z^2 + w^2$ subject to the constraint $3x + 2y - 4z + w - 3 = 0$. This answer is

(A) $\frac{1}{10}$ **(B)** $\frac{3}{10}$ **(C)** $\frac{5}{10}$ **(D)** $\frac{7}{10}$ **(E)** None of these

18. $\int_1^2 \int_0^x (2xy + 3)\, dy\, dx =$

(A) $\frac{33}{4}$ **(B)** $\frac{35}{4}$ **(C)** $\frac{37}{4}$ **(D)** $\frac{39}{4}$ **(E)** None of these

19. Let $f(t) = t^2 \sec t$. What is $f'\left(\frac{\pi}{3}\right)$?

(A) $\frac{\pi}{3} + \frac{\sqrt{3}\pi^2}{18}$ **(B)** $\frac{4\sqrt{3}\pi + 2\pi^2}{9}$ **(C)** $\frac{4\pi}{3} + \frac{2\sqrt{3}\pi^2}{9}$ **(D)** $\frac{4\pi}{3} + \frac{\sqrt{3}\pi^2}{9}$

(E) None of these

20. Find the radius of convergence for the series $\sum_{n=0}^{\infty} \frac{(-1)^{n+1}(x-2)^{n+1}}{n+1}$.

(A) 0 **(B)** 1 **(C)** 2 **(D)** ∞ **(E)** None of these