2011 2012 综

□A 卷

课程名称： C ; 课程代码： MATH120005

开课院系： 考试形式：闭卷

姓 名： 学 号： 专 业：

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$3' \times 5$

1 $\frac{\sin x}{x}$ $f(x)$ $\int_{\frac{\pi}{2}}^{\pi} x f'(x) dx =$__________________

$\mathbf{\frac{4}{\pi} - 1}$

2 $\lim_{x \to 0} \frac{\sin 6x + x f(x)}{x^3} = 0$ $\lim_{x \to 0} \frac{6 + f(x)}{x^2} =$__________________

36

3 $A = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 2 & 1 & 0 \\ 0 & 0 & 3 & 2 & 0 \\ 0 & 0 & 0 & 0 & 3 \end{pmatrix}$ $(A^*)^{-1} =$________________________

$$\begin{bmatrix} \frac{1}{6} & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{3} & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{3} & \frac{1}{6} & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{3} & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} \end{bmatrix}$$

4 $\lim_{n\to\infty}\sqrt[n]{2^n+3^n}=$______

3

5 $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\frac{x-\cos x}{1+\sin^2 x}dx=$______

$-\frac{\pi}{2}$

$3'\times 5$

1 $\lim_{x\to x_0} f(x)=\infty$ $f(x)$ x_0

A B. C. D.

A

2 $\lim_{x\to 0}\frac{f(x)}{x}=2$ $\lim_{x\to 0}\frac{\sin 2x}{f(3x)}=$

A $3/2$ B. $2/3$ C. $1/3$ D. $4/3$

C

3 A $\begin{cases} x_1+x_2+x_3=0 \\ x_1+tx_2+x_3=0 \\ x_1+x_2+tx_3=0 \end{cases}$ ： $B\neq 0$ $AB=0$

A. $t=-2,\ |B|=0$ B. $t=-2,\ |B|\neq 0$ C. $t=1,\ |B|=0$ D. $t=1,\ |B|\neq 0$

C

4 Newton-Leibniz

A $\int_0^6\frac{x^3}{1+x^2}dx$ B. $\int_{-1}^1\frac{x}{\sqrt{1-x^2}}dx$ C. $\int_0^6\frac{x}{(x^2-6)^2}dx$ D. $\int_{\frac{1}{e}}^{e}\frac{1}{x\ln x}dx$

A

5 $\forall x$ $f(-x)=-f(x)$ $f'(-x_0)=-k\neq 0$ $f'(x_0)=$

A $\frac{1}{k}$ B. $-\frac{1}{k}$ C. $-k$ D. k

C

: $(6'\times 8)$

1 $\lim\limits_{x\to 0}\frac{\int_0^x\left(\sqrt{1+t^2}-\sqrt{1-t^2}\right)dt}{x^2\sin x}$

$\mathbf{\frac{1}{3}}$

2 $\int\frac{\cos^2 x-\sin x}{\cos x\left(1+\cos x e^{\sin x}\right)}dx$

$\mathbf{\ln\left|\frac{\cos x}{1+e^{\sin x}\cos x}\right|+C}$

3. $y=f(x)$ $xy^2+\sin x^3=y\cdot 3^x$ dy

$\mathbf{\frac{3^x y\ln 3-y^2-3x^2\cos x^3}{2xy-3^x}dx}$

4 $y=\arctan\left(3e^x\right)$ $\frac{dy}{d\sin x}$

$\mathbf{\frac{3e^x}{(1+9e^{2x})\cos x}}$

5. $f(x)=\begin{cases}1, x<0\\ x+1, 0\le x\le 1\\ 2x, x>1\end{cases}$ $\int f(x)dx$

$$\int f(x)dx=\begin{cases} x+C & x<0\\ \frac{1}{2}x^2+x+C & 0\le x<1\\ x^2+\frac{1}{2}+C & x>1\end{cases}$$

6. $\int_0^{\frac{1}{2}}\sqrt{\frac{1-2x}{1+2x}}dx$

$$\boldsymbol{\frac{\pi}{4}-\frac{1}{2}}$$

7 $\int_0^{+\infty}\frac{dx}{\left(1+x^2\right)^2}$

$$\boldsymbol{\frac{\pi}{4}}$$

8. $A=\begin{pmatrix} a & b & c & d \\ -b & a & -d & c \\ -c & d & a & -b \\ -d & -c & b & a \end{pmatrix}$ $|A|$

$$\boldsymbol{(a^2+b^2+c^2+d^2)^2}$$

$5'\times 2$

1 $f(x)$ $[0,1]$; $f(1)-f(0)=1$ $\int_0^1[f'(x)]^2dx\geq 1$

$\because [f'(x)-1]^2\geq 0$ $[f'(x)]^2\geq 2f'(x)-1$

$\therefore \int_0^1[f'(x)]^2dx\geq\int_0^1[2f'(x)-1]dx=2[f(1)-f(0)]-1=1$

2 $f'(x)$ $[a,b]$; $f'(a)<f'(b)$ r $f'(a)$ $f'(b)$ (a,b)

ξ $f'(\xi)=r$

$F(x)=f(x)-rx$ $F(x)$ $[a,b]$; $F(\xi)$

$F'(x)=f'(x)-r$ $\because f'(a)<r<f'(b)$ $\therefore F'(a)<0$ $F'(b)>0$.

$F(x)=F(a)+F'(a)(x-a)+o(x-a)$

$x\in(a,a+\varepsilon)$ ε $F(\xi)\leq F(x)<F(a)$ $\therefore \xi\neq a$

$\xi\neq b$ $\therefore \xi\in(a,b)$.

$F(x)$ ξ $F(\xi)$ **Fermat** $F'(\xi)=0$

$\left(12'\right)$

1 P $\dfrac{x^2}{25}+\dfrac{y^2}{9}=1$； F_1 F_2 $\left|PF_1\right|\cdot\left|PF_2\right|$ $\left(5'\right)$

$\boldsymbol{Z_{\max}=25}$

2 $\begin{cases} kx_1+x_2+x_3=5 \\ 3x_1+2x_2+kx_3=18-5k \\ x_2+2x_3=2 \end{cases}$ k

$\left(7'\right)$

1 $\boldsymbol{k\neq 3}$ $\boldsymbol{k\neq 1}$

2 $\boldsymbol{k=3}$

3 $\boldsymbol{k=1}$ $\boldsymbol{x=\lambda\begin{pmatrix}1\\-2\\1\end{pmatrix}+\begin{pmatrix}3\\2\\0\end{pmatrix}}$ $\lambda\in \boldsymbol{R}$·