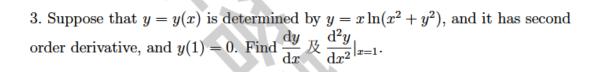
## 东南大学考试卷

课程名称\_高等数学AB(上)期中 考试学期\_14-15-2 得分\_\_\_\_\_\_ 适用专业 双语班 考试形式 闭卷 考试时间长度 120 分钟

题号	_	=	Ξ	四	五	六	七
得分							
评阅人							

- 一、 填空题(本题共8小题,每小题4分,满分32分)
- 1. Let  $y = x^5 e^{-x}$ , then y is increasing on\_\_\_\_\_.
- 2. Let  $y = \log_x e(x > 0, x \neq 1)$ , then dy =\_\_\_\_\_\_
- 3. Suppose that f is continuous on (-1,1), then  $\lim_{x\to 0} \frac{\sqrt[3]{1+f(x)\sin x}-1}{3^x-1} =$
- 4. The discontinuity points of  $f(x) = \lim_{n \to \infty} \frac{1+x}{1+x^{2n}}$  is  $x = \underline{\hspace{1cm}}$ , and it is \_\_\_\_\_\_, and it is \_\_\_\_\_\_.
- 5. If  $x = \underline{\hspace{1cm}}$ , then the tangent line to the curve  $y = \arcsin \frac{x}{2}$  is perpendicular to the tangent line to  $y = x^2$ .
- 6. Let  $\{a_n\}$  be the sequence with  $\lim_{n\to\infty} \frac{a_1 + a_2 + \cdots + a_n}{n} = a(a \text{ is finite})$ , then  $\lim_{n\to\infty} \frac{a_n}{n} = \underline{\qquad}$ .
- 7. If  $y = \frac{x^2}{1-x}$ , then  $y^{(5)}(x) = \underline{\hspace{1cm}}$ .
- 8. Let  $f(x) = \begin{cases} \frac{\sin x}{x}, & x \neq 0 \\ 1, & x = 0 \end{cases}$ , then  $f''(0) = \underline{\qquad}$ .
- 二、 计算下列各题(本题共4小题,每小题8分,满分32分)
- 1. Let  $f(x) = a^x + x^a + x^x + a^a$  (where  $x > 0, x \neq 1$ , and  $a > 0, a \neq 1$  is a constant), find f'(x).

2. Let y=y(x) be determined by the parametric equations  $\left\{\begin{array}{l} x=2+t^2\\ y=t\sin t\end{array}\right..$  Find  $\frac{\mathrm{d}y}{\mathrm{d}x}$  and  $\frac{\mathrm{d}^2y}{\mathrm{d}x^2}$ .



4. Find  $\lim_{x \to +\infty} x^{\frac{7}{4}} (\sqrt[4]{x+1} + \sqrt[4]{x-1} - 2\sqrt[4]{x}).$ 

三、 (本题满分7分) Let  $f(x) = |x^2 - 4| \ln(3 + x)$ .

- (1) Discuss the differentiability of f on its domain;
- (2) Find f'(x) at the points where f is differentiable.

四、 (本题满分7分) Find the Maclaurin polynomial of  $f(x) = \arcsin x$  with Peano reminder of order 5.

五、(本题满分7分) Show that

$$1 + x \ln(x + \sqrt{1 + x^2}) > \sqrt{1 + x^2}, \quad x > 0$$

六、 (本题满分7分) Let  $a_1=2, a_n=2-\frac{1}{a_{n-1}^2}, n=2,3,\cdots$ . Show that  $\{a_n\}$  converges, and find  $\lim_{n\to\infty}a_n$ .

## 七、 (本题满分8分)

- 1. Show that the equation  $x^n + nx 2 = 0$  (n is positive integer) has only one positive real root  $a_n$ ;
- 2. Calculate  $\lim_{n\to\infty} (1+a_n)^n$ .