

國立高雄大學九十五學年度轉學招生考試試題

科目：微積分

系所：土木與環境工程學系二年級

可

使用計算機

考試時間：90 分鐘

本科原始成績：滿分 100 分

否

1. Find the first derivative of the function (10)

i、  $f(x) = \frac{x}{x + \frac{c}{x}}$ ,  $c$  is a constant

ii、  $g(\theta) = 5\theta \sec \theta + \theta \tan \theta$

2. Find the limit (10)

i、  $\lim_{x \rightarrow 0} \frac{\sin x (1 - \cos x)}{4x^2}$

ii、  $\lim_{x \rightarrow 0} \frac{1}{x^3} \int_0^x \sin(t^2) dt$

3. Find an equation of the tangent line to  $y^2 = 5x^4 - x^2$  at the point (1, 2). (10)

4. If  $f$  is the focal length of a convex lens and an object is placed at a distance  $p$  from the lens, then its image will be at a distance  $q$  from the lens, where  $f$ ,  $p$  and  $q$  are related by the lens equation

$$\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$$

Find the rate of change of  $p$  with respect to  $q$ . (10)

5. Evaluate the integral. (20)

i、  $\int \frac{dx}{x \ln x}$

ii、  $\int \cos \theta \cos^5(\sin \theta) d\theta$

6. Find the arc length of the graph of  $f(x) = \frac{1}{2}x^2$  from  $x=0$  to  $x=1$ . (15)

7. The region  $R$  enclosed by the curves  $y=x$  and  $y=x^2$  is rotated about the  $x$ -axis. Find the volume of the resulting solid. (10)

8. Find the center of mass of a solid hemisphere of radius  $R$  m if its density at height  $z$  m above the base plane of the hemisphere is  $\delta_0 z$  kg/m<sup>3</sup>. (15)