

國立成功大學

112學年度碩士班招生考試試題

編 號：147

系 所：環境工程學系

科 目：微積分

日 期：0206

節 次：第 3 節

備 註：不可使用計算機

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Please find the derivate of the following functions. (5 points each, 15 points total)

(1) $y = \sin \sqrt[3]{x} + \sqrt[3]{\sin x}$

(2) $F(x) = \int_0^{e^{2x}} \ln(t+1)dt$

(3) $f(x) = \arcsin x + \arccos x$

2. Find the differential dy of $y = x\sqrt{1-x^2}$. (5 points)

3. Determine the slope of the graph of $(x^2 + y^2)^2 = 4x^2y$ at the point (1, 1). (10 points)

4. Which point(s) on the graph of $y = \sqrt{x-8}$ is(are) closest to the point (12, 0)? (10 points)

5. Please find the relative extrema and the point of inflection of $y = x^2 \ln \frac{x}{4}$. (10 points)

6. Please find the volume of the solid generated by revolving the region bounded by the graphs of the following functions about the x -axis. (10 points)

$$y = e^{x/4}, y = 0, x = 0, x = 6$$

7. Please find the arc length of the graph of the following function over the indicated interval. (10 points)

$$y = 31 - 10(e^{x/20} + e^{-x/20}), -20 \leq x \leq 20$$

8. Please find or evaluate the integral of the following functions. (6 points each, 30 points total)

(1) $\int x^5 \ln x dx$

(2) $\int_0^{3/5} \sqrt{9-25x^2} dx$

(3) $\int_1^5 \frac{x}{\sqrt{2x-1}} dx$

(4) $\int \sin(-7x) \cos(6x) dx$

(5) $\int_0^8 \frac{3}{\sqrt{8-x}} dx$