

八十八學年度 微積分 科號 0901 共 2 頁第 1 頁 *請在試卷【答案卷】內作答

1. Evaluate $\lim_{n \rightarrow \infty} U_n$: (16%)

$$a. U_n = \frac{1+2+\dots+n}{n(n+2)}$$

$$b. U_n = \frac{\sqrt{n^2+1} + \sqrt{n}}{\sqrt[3]{n^3+n}-n}$$

$$c. U_n = \frac{(\sqrt{n^2+1}+n)^2}{\sqrt[3]{n^6+1}}$$

$$d. U_n = n(\sqrt{n^2+1}-n)$$

2. Find the differential for the following: (24%)

$$a. \arcsin \sqrt{x}$$

$$b. \cosh \frac{1}{x}$$

$$c. \sqrt{x+1} - \ln(x + \sqrt{x+1})$$

$$d. \frac{1}{2} (a^2 \arcsin \frac{x}{a} + x \sqrt{a^2 - x^2})$$

$$e. \frac{1}{2} \arctan x + \frac{1}{4} \ln \frac{(x+1)^2}{x^2+1}$$

$$f. \sinh^3 x$$

3. Find the values of the following integrals: (20%)

$$a. \int a^x dx$$

$$b. \int \frac{1}{\cos^2 x} dx$$

$$c. \int \frac{1}{1+x^2} dx$$

$$d. \int \frac{1}{\sinh^2 x} dx$$

$$e. \int \frac{dx}{\sqrt{(b+ax)^2}}$$

八十八學年度 生命科學 系(所) 丙 組碩士班研究生招生考試

微積分

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4. Find the values of the following integrals: (40%)

$$a. \int_0^{\pi/2} \frac{dx}{2 \cos x + 3}$$

$$b. \int \frac{dx}{x^2(x+1)}$$

$$c. \int_0^1 \frac{e^{-x}}{\sqrt{x}} dx$$

$$d. \int_0^{\pi} \frac{\sin^2 x}{x^2} dx$$

$$e. \int_0^{\pi} \frac{dx}{\sqrt{2^2 - x^2}}$$

$$f. \int \frac{dx}{x\sqrt{x-1}}$$

$$g. \int_2^6 \frac{dx}{3x^2 - 5x + 2}$$

$$h. \int_1^9 \frac{du}{\sqrt{u}}$$

$$i. \int_1^e \frac{x dx}{\sqrt{x-1}}$$

$$j. \int \frac{\arctan x}{x^2} dx$$