

微積分八系共同教學考題

九十三學年度微積分上學期第二次期中考

- 前四題每題十五分, 後四題每題十分。
- 將桌面淨空, 並準備學生證以備查驗。
- 將答案卷對摺, 每頁兩欄書寫(two columns)
- 不可使用含有計算功能之電子儀器設備, 每題作答須有計算或推導過程, 答案卷必須寫上姓名學號科系, 否則一律以零分計。

1. (15%) Let $G(x) = \int_0^x [s \int_0^s f(t) dt] ds$, where f is continuous for all real t .

Find

(a) $G(0)$.

(b) $G'(0)$.

(c) $G''(x)$.

2. (15%) If $f(x) = \int_2^x \frac{dt}{\sqrt{1+t^4}}$, find $(f^{-1})'(0)$.

3. (15%) Find the integrals.

(a) $\int \sqrt{2x-1} dx$

(b) $\int x\sqrt{2x-1} dx$

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

4. (15%) Find

(a) $\frac{d}{dx}[e^x]$.

(b) $\frac{d}{dx}[x^e]$.

(c) $\frac{d}{dx}[x^x]$.

5. (10%) Find the integrals.

(a) $\int \frac{dx}{x \ln x}$

(b) $\int \frac{\ln x dx}{x}$

6. (10%) Find $\int \frac{dx}{\sqrt{e^{2x}-1}}$.

7. (10%) Find $\int 2^x dx$.

8. (10%) Evaluate $\int_{-\pi/2}^{\pi/2} (\sin^3 x \cos x + \sin x \cos x) dx$.