

國立中央大學八十七學年度碩士班研究生入學試題卷

所別： 應用地質研究所 不分組 科目：

微積分

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- 1) Show that if $\tan y = x$ and $-\pi/2 < y < \pi/2$, then
$$\frac{dy}{dx} = \frac{1}{1+x^2} \quad 10\%$$
- 2) Evaluate $\lim_{x \rightarrow \pi/2} \frac{2x + \sec x}{3 + \tan x}$ and $\lim_{x \rightarrow 0^+} (\csc x - \cot x)$. 12%
- 3) Find $\int_0^1 x\sqrt{x+1} dx$ and $\int_{-1}^1 \frac{1}{x^3} dx$ 12%
- 4) Find $\int_2^4 \frac{\sqrt{x^2-4}}{x} dx$ and $\int \frac{x^2+3x+3}{x(x+2)^2} dx$. 12%
- 5) An outdoor thermometer reading -3°C is into a 20°C room. One minute later the thermometer reads 5°C . How long will it take to reach 19.5°C ? 12%
- 6) Find the length of the spiral $r=e^{\theta/2}$ for the range $2\pi \geq \theta \geq 0$. 12%
- 7) Evaluate $\int_0^2 \int_0^{\sqrt{4-x^2}} e^{-x^2} e^{-y^2} dy dx$ 10%
- 8) Find the maximum and minimum values of $f(x,y,z)=2x-2y+z$ for (x,y,z) lying on the sphere $x^2+y^2+z^2=9$. 10%
- 9) Solve the differential equation $y''-5y'+6y=0$. 10%