國立中央大學八十八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 共 二 頁 第 一 頁

1) If $f(x) = x^n$, where n is a positive integer, then $f'(x)=nx^{n-1}$ and find $f'(-1)$ if $f(x)=x^9$. 10%

2) Evaluate $\lim_{t\to 0}(\frac{t^2+1}{t})\sin(t)$ and $\lim_{x\to 0}\frac{x}{1+\sin x}$. 10%

3) Find $\int_1^3 (2x^2-5)\,dx$ and $\int_1^2 \sqrt{3+2t-t^2}\,dt$. 10%

4) Find $\int_0^4 \frac{1}{\sqrt{x}}dx$ and $\int_{-1}^{8} x^{-2/3}\,dx$. 10%

5) Find the area of the region bounded by the x-axis, the line x=2, and the graph of $f(x)=x^3-2x^2+3$. 10%

6) Find the volume generated when the region bounded on [-1, 0] by the x-axis and the graph of $y=x^2+1$ is revolved about the line $y=2$. 10%

7) Show that $\lim_{x\to\infty}(1+1/x)^x = e$ and $e^x = \sum_{n=0}^{\infty}\frac{x^n}{n!}$ 10%

8) Determine $\iint_S z\,d\sigma$, where S is described by $z=\sqrt{4-x^2-y^2}$. 10%

9) Solve the following differential equations. 20%

a) $\frac{dy}{dx}+y=xy^3$

b) $y''-4y'+4y=e^x\sin(x)$ with the condition $y(0)=0$, $y'(0)=0$.

參考用