題號： 251
科目：微積分(B)
節次： 7

國立臺灣大學 108 學年度碩士班招生考試試題

題號： 251
共 1 頁之第 1 頁

1. Express d^2y/dx^2 in terms of x and y for $4\tan y = x^3$. (10%)

2. Sketch the graph of $f(x)=\dfrac{1+\sqrt{x}}{1-\sqrt{x}}$, and indicate the extrema, inflection points, concavity, and asymptotes (if any). (20%)

3. Calculate the given integral. (a) $\displaystyle\int \frac{dx}{x\sqrt{1-(\ln x)^2}}$. (b) $\displaystyle\int_0^\infty e^{-x}\sin x\, dx$. (15%)

4. Find the indicated limit. $\displaystyle\lim_{n\to\infty}\left[(n^k + n^{k-1})^{1/k} - 1\right]$, k>0. (10%)

5. Determine whether the series converges or diverges. (a) $\displaystyle\sum k\left(\frac{2}{3}\right)^k$ (b)

    $\dfrac{2}{3} + \dfrac{2\cdot 4}{3\cdot 7} + \dfrac{2\cdot 4\cdot 6}{3\cdot 7\cdot 11} + \dfrac{2\cdot 4\cdot 6\cdot 8}{3\cdot 7\cdot 11\cdot 15} + \cdots\cdots$ (10%)

6. Find the Taylor polynomial of the function $\cos x$ for the given values of a = $\pi/3$ and n = 4, and give the Lagrange form of the remainder. (15%)

7. Use a triple integral to find the volume of the solid. The solid bounded above by the elliptic paraboloid $z = 12 - x^2 - 2y^2$ and below by the elliptic paraboloid

    $z = 2x^2 + y^2$. (10%)

8. Fine the area of the surface of the cone z = $\sqrt{x^2 + y^2}$ lies between the planes z = 0 and z = 3. (10%)

試題隨卷繳回