

1. Sketch a figure and display the general nature of the function $(x^3-1)/x$. (15%)
2. Find dy/dx and d^2y/dx^2 for the curve $C: x=t^2, y=t^5$. (10%)
3. Find the area enclosed by the curve $x(t) = a \cos t, y(t) = b \sin t, 0 \leq t \leq 2\pi$, and the volume generated by revolving the curve about the x -axis. (15%)
4. Calculate $\int \frac{x^5+2}{x^2-1} dx$. (10%)
5. Find $\lim_{x \rightarrow \infty} \frac{1}{x} \int_0^x \sin\left(\frac{1}{t+1}\right) dt$ if it exists. (10%)
6. Find the Taylor series expansion of $e^{-x}\sqrt{x+1}$ at $x=0$, and give the radius of convergence. (10%)
7. Set $g(x, y) = \begin{cases} \frac{x^2 y^2}{x^4 + y^4} & (x, y) \neq (0, 0) \\ 0 & (x, y) = (0, 0) \end{cases}$ (a) Evaluate $\partial g / \partial x$ at $(0, 0)$. (b) Is $g(x, y)$ continuous at $(0, 0)$? (10%)
8. Integrate \vec{h} over the indicated path: $\vec{h}(x, y) = (x+2)y\vec{i} + (2x+y)\vec{j}$; $y=x^2$ from $(0,0)$ to $(2,4)$. (10%)
9. Evaluate the double integral $\int_0^2 \int_0^{\ln y} e^{-x} dx dy$. (10%)

試題隨卷繳回