

微積分

1. $g(y) = \sqrt{5 - \sqrt{3}y}$ is given. Please compute $\frac{dg}{dy}$. (10%)

2. Please compute (i) $\int_2^1 x\sqrt{5+6x}dx$ (ii) $\lim_{x \rightarrow 3} \frac{\frac{1}{x} - \frac{1}{3}}{x-3}$ (iii) $\lim_{x \rightarrow \infty} \frac{\ln x}{x^h}$ ($h > 0$).
(24%)

3. Please find out the relatively maximum and minimum points and the point of inflection of $y = \frac{x-1}{x^2+3}$. (20%)

4. Please solve the differential equation of $(x^3 + y^3) dx - 3xy^2 dy = 0$. (24%)

5. If $R = \{(x, y) | 1 \leq x^2 + y^2 \leq 4, x \geq 0, y \geq 0\}$, please compute

$$\iint_R \frac{1}{x^2 + y^2} dx dy. \quad (22\%)$$