

科目名稱: 微積分 系別: 各系所
註: 本次考試不可參考書籍及筆記

不可使用字典

共一頁
不可使用計算機

1. Evaluate the limits:(每小題8分)

(a) $\lim_{x \rightarrow 4} \frac{x-4}{\sqrt{x+5}-3}$.

(b) $\lim_{x \rightarrow 2^-} \left(\frac{x^2-2}{x-2} \right)$.

2. Find the derivatives $\frac{dy}{dx}$ of the following:(每小題8分)

(a) $y = e^x \cos(x)$.

(b) $y = (1+x)^x$.

(c) $\sec(x+y) = -2xy + y^2$.

3. For the equation $\sin(x) + \cos(y) = \sin(x) \cos(y)$, find $\frac{dy}{dx}$ and the equation of the tangent line(切線) at $\left(0, \frac{\pi}{2}\right)$. (10分)4. Find all extreme values of the function $f(x) = \int_0^x (1 + \cos(t))^2 dt$ on the interval $[0, 2\pi]$.(8分)

5. Evaluate the following:(每小題10分)

(a) $\int \left(\frac{x}{5} - \frac{8}{x^3} + 5x^4 \right) dx$.

(b) $\int x \ln(x) dx$

6. Find a power series (冪級數) for $f(x) = \cos(x^2)$, centered at 0, use the power series to approximate the value of $\int_0^1 \cos(x^2) dx$ with the error less than 0.001. (14分)7. Find all relative extreme values of $f(x, y) = x^3 - 3xy + y^3$. (8分)