大同大學 106 學年度 轉學考試 試題

1. Evaluate the limits:(每小題7分)

    (a) $\lim\limits_{x \to 3} \dfrac{x^2 - 5x + 6}{x - 3}$.

    (b) $\lim\limits_{x \to -2^-} \left(\dfrac{x^2 + 4}{x + 2} \right)$.

2. Find the derivatives $\dfrac{dy}{dx}$ of the following:(每小題7分)

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

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

    (c) $y = \displaystyle\int_1^x \tan(t^2 + 1)\,dt$.

3. For the equation $\sin(y) - \cos(x) = \sin(y)\cos(x) + 1$, find $\dfrac{dy}{dx}$ and the equation of the tangent(切線) at (π, π). (10%)

4. Find the absolute maximum and minimum values of $f(x) = x^2 e^{-x}$ in $[0, \infty)$. (10%)

5. Evaluate the following:(每小題7分)

    (a) $\displaystyle\int \left(\dfrac{x}{3} + \dfrac{7}{x^3} + 5x^4 \right) dx$.

    (b) $\displaystyle\int \dfrac{3x^2 + 4}{\sqrt{x^3 + 4x + 13}}\, dx$.

    (c) $\displaystyle\int x \ln(x)\, dx$.

    (d) $\displaystyle\int_1^\infty \dfrac{1}{(x + 1)^2}\, dx$.

    (e) $\displaystyle\int_0^1 \int_x^1 e^{y^2}\, dy\, dx$.

6. Find a power series (冪級數) for $f(x) = \sin^2(3x)$, centered at 0. (10%)