1. Evaluate the limits:(每小題8分)

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

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

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

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

    (b) $y = x^{(1-x)}$.

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

3. For the equation $\sin x + \cos y = \sin x \cos y$, find $\dfrac{dy}{dx}$ and the equation of the tangent(切線) at $\left(0, \dfrac{\pi}{2} \right)$.　　　　(10分)

4. The edge(邊) of an ice cube(正方體) was found to be 30cm. Suppose that there was a possible error(誤差) in measurement(量測) of 0.1cm on the edge, what is the maximum possible error in computing the volume?　　　　(8分)

5. Find all extreme values of the function $f(x) = \displaystyle\int_0^x 1 + \sin t \; dt$ on the interval $[0, 2\pi]$.　　(8分)

6. Evaluate the following:(每小題8分)

    (a) $\displaystyle\int \left(\dfrac{x}{4} - \dfrac{7}{x^2} + 4x^3 \right) dx$.

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

    (c) $\displaystyle\int x \ln x \; dx$

7. Find a power series (冪級數) for $f(x) = \cos^2(3x)$, centered at 0.　　　　(10分)