大同大學 106 學年度第 1 學期期中考試試題

科目代號:**G1011** 科目名稱: 微積分 (一) 班級: **XXXX** 座號: 姓名:
註: 本次考試不可參考自己的書籍、筆記。不可用計算機、電子辭典。

1. Find the limits.

   (5%)(a.) $\lim_{x\to 0} \dfrac{\sin^3(3x)}{x^3}$, (5%)(b.) $\lim_{x\to 0} \dfrac{x}{\sqrt{4+2x}-\sqrt{4-2x}}$.

2. Find the derivative y' of the followings.

   (5%)(a.) $y = 3\sqrt[5]{x} - \dfrac{3x}{\sqrt{x}} + \dfrac{4}{x^2}$, (5%)(b.) $y = x^6 e^x \cos x$,

   (5%)(c.) $y = (3x^3 - 2x^2 + 4)^{12}$, (5%)(d.) $y = \dfrac{x^3 - 6}{x^6 + 3x}$ (use the Quotient Rule).

3. (10%) Find an equation of the tangent line(切線) to the graph of $f(x) = \ln(x^2 + 1)$ when $x = -1$.

4. (10%) Find the maximum(最大值) and minimum(最小值) of $f(x) = \dfrac{x}{2} - \sin x$ on the interval $[0, 2\pi]$.

5. (10%) Let $f(x) = -3x^5 + 5x^3 + 5$.
   (a.) Find the relative extrema(相對極值) of $f(x)$.
   (b.) Determine the open intervals on which $f(x)$ is increasing(遞增的) or decreasing(遞減的).

6. (10%) Let $f(x) = e^{-\frac{1}{8}(x-2)^2}$.
   (a.) Find the points of inflection(反曲點).
   (b.) Determine the open intervals on which the graph of $f(x)$ is concave upward(凹口向上) or concave downward(凹口向下).

7. Find $\frac{dy}{dx}$ of the followings.

   (10%)(a.) $y = \tan^6 e^{4x}$,

   (10%)(b.) $y = x^{2x}$,

   (10%)(c.) $e^{xy} - \sqrt{x^2 + y^2} = x^3 + 6$.