大同大學 106 學年度第 1 學期期末考試試題

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

2. (10%) Let $f(x) = \left(4x^2 - 1\right)^{2/3}$.
   (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).

3. (10%) Let $f(x) = e^{-\frac{1}{2}(x+2)^2}$.
   (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).

4. Find the integral.

   (5%)(a.) $\displaystyle\int \frac{x^3 + 3}{x\sqrt{x}}\,dx,$　　(5%)(b.) $\displaystyle\int_0^1 \frac{1}{5x + 2}\,dx.$

5. Find the integral.

   (10%)(a.) $\displaystyle\int \frac{x^4 + 6x^2}{\sqrt[4]{x^5 + 10x^3 + 3}}\,dx,$　　(10%)(b.) $\displaystyle\int x^4 \ln x\,dx,$

   (10%)(c.) $\displaystyle\int \frac{3 - x}{\sqrt{4x - x^2}}\,dx,$　　(10%)(d.) $\displaystyle\int e^{-x}\sin(2x)\,dx,$

   (10%)(e.) $\displaystyle\int \frac{x^4 + 3x^2 + 2x}{x^2 + 4}\,dx.$

6. (10%) Let $F(x) = \displaystyle\int_{-2x}^{e^x} \frac{t^2}{1 + \cos^2 t}\,dt$, find $F'(x)$.