大同大學 107 學年度第 1 學期期中考試試題

科目代號:**XXXXX** 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. (12%) Find the limits.

   (a) $\lim_{x\to 0} \dfrac{\sin(3x)}{\tan x}$ (b) $\lim_{x\to -4} \dfrac{\sqrt{13+x}-3}{x+4}$

2. (12%) Find the derivative $\frac{dy}{dx}$ of the followings.

   (a) $y = \sqrt[5]{x} - \dfrac{2}{\sqrt[3]{x}} + \dfrac{3}{x^2}$ (b) $y = x(\sin x)(\ln x)$

3. (12%) Find the derivative $\frac{dy}{dx}$ of the followings.

   (a) $y = (x + \sqrt{1+x})^{10}$ (b) $y = \dfrac{e^x + e^{-x}}{e^x - e^{-x}}$**(use the Quotient Rule)**

4. (10%) Find an equation of the tangent line to the graph of $f(x) = xe^x$ when $x = -2$.

5. (12%) Let $f(x) = x^{1/3}(x-3)^{2/3}$. Find all the points for which $f'(x) = 0$ and those for which $f'(x)$ does not exist.

6. (10%) Find the derivative $\frac{dy}{dx}$ for $y = \tan^8(e^{5x})$.

7. (12%) Find the derivative $\frac{dy}{dx}$ for $y = e^8 + e^{8x} + e^{x+8} + e^{x^8} + e^{8^x} + 8^{x^e}$.

8. (10%) Find $\dfrac{dy}{dx}$ of $y = (x+1)^{\ln x}$.

9. (10%) Find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ of $2x^2 + y^2 = 5$ (use Implicit Differentiation),
   and evaluate them at the point $(\frac{1}{\sqrt{2}}, -2)$.