

大同大學 107 學年度第一學期期中考試試題

科目代號:XXXX

科目名稱: 微積分 (一)

班級: XXXX

座號:

姓名:

註: 本次考試不可參考書籍及筆記

不可使用計算機

1. Find the limits. (20%)

(a)  $\lim_{x \rightarrow 0} \left( \frac{\sin(3x)}{\tan(x)} + \frac{\tan(5x)}{\sin(2x)} \right).$

(b)  $\lim_{x \rightarrow -4} \frac{\sqrt{13+x} - 3}{x+4}.$

(c)  $\lim_{x \rightarrow -\infty} \frac{\sqrt{x^2+x}}{-2x}.$

(d)  $\lim_{x \rightarrow 5^-} \left( 4 \left\lfloor \frac{x+2}{2} \right\rfloor - x \right), \llbracket x \rrbracket \text{ 爲高斯函數}.$

2. Find the derivative  $y'$  of the followings. (25%)

(a)  $y = \sqrt[5]{x} - \frac{2}{\sqrt[3]{x}} + \frac{3}{x^2}.$

(b)  $y = x \sin(\ln(x)).$

(c)  $y = (x + \sqrt{1+x})^{10}.$

(d)  $y = \frac{e^x + e^{-x}}{e^x - e^{-x}}$  (use the Quotient Rule).

(e)  $y = \sec^2(x).$

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

4. Find the absolute maximum and minimum of  $f(x) = x^5 + \frac{10}{3}x^3 + 5x - 7$  on the interval  $[0, 1]$ . (5%)

5. Let  $f(x) = x^{1/3}(x-3)^{2/3}$ . (10%)

(a) Find the relative extrema of  $f(x)$ .

(b) Determine the open intervals on which  $f(x)$  is increasing or decreasing.

6. Let  $f(x) = x^3 + 9x^2 + 33x - 8$ . (10%)

(a) Find the points of inflection(反曲點).

(b) Determine the open intervals on which the graph of  $f(x)$  is concave upward or concave downward.

7. Evaluate the following: (20%)

(a) Find  $\frac{dy}{dx}$  of  $y = (x+1)^{\ln(x)}.$

(b) Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  of  $x^{2/3} + y^{2/3} = 8.$