

國立宜蘭大學 機械與機電工程學系 一年級 102(1) 微積分 期末考試

日期： 103 年 1 月 14 日

時間： 17:10 - 18:00

得	
分	

班級：

學號：

姓名：

共十題，每題 10 分。

1. (a) $y = \sqrt{2x \sin x}$, find $\frac{dy}{dx}$

(b) $y = x^2 \cot 5x$, find $\frac{dy}{dx}$

2. (a) $y = \left(\frac{2\sqrt{x}}{2\sqrt{x+1}} \right)^2$, find $\frac{dy}{dx}$

(b) $y = \ln(\sin^2 x)$, find $\frac{dy}{dx}$

3. (a) $y = \log_5(3x-7)$, find $\frac{dy}{dx}$

(b) $y = 9^{2x}$, find $\frac{dy}{dx}$

4. (a) $e^{x+2y} = 1$, find $\frac{dy}{dx}$

(b) $x^2 - y^2 = 1$, find $\frac{d^2y}{dx^2}$

5. (a) The parabola $y = x^2 + C$ is to be tangent to the line $y=x$, Find C

(b) Find the tangent line to the curve $y = \frac{\pi \sin x}{x}$, at $x = \pi$

6. (a) $y = (\sin x)^{\sqrt{x}}$, find $\frac{dy}{dx}$

(b) $y = (\ln x)^{1/(\ln x)}$, find $\frac{dy}{dx}$

7. Use differentials to estimate

(a) $7.98^{1/3}$

(b) $\sin(\pi/4 + 0.01)$

8. (a) Find all critical points for $f(x) = \frac{x^2}{x-2}$

(b) Find the extreme value of $f(x) = e^x + e^{-x}$ and where they occur.

9. (a) Find all possible functions with the derivative $y' = 4x - \frac{1}{\sqrt{x}}$

(b) Find the absolute max value of $f(x) = x^2 \ln(1/x)$ and where it occur a

10. $a = \frac{dv}{dt}$, $v = \frac{ds}{dt}$, if $a = -4 \sin 2t$, $v(0) = 2$, $s(0) = -3$, Find $v(t)$ and $s(t)$