

國立宜蘭大學 103(1) 機械與機電工程學系 一年級 微積分一 期中考試

日期：103 年 11 月 10 日

時間：9:00 - 10:10

得	
分	

班級：

學號：

姓名：

1-7 題，每題 10 分。第 8 題每小題 5 分。

1. Find the indicated derivatives (a) $\frac{ds}{dt}$ if $s = \frac{t}{2t+1}$

(b) $\frac{dz}{dw}$ if $z = \frac{1}{\sqrt{3w-2}}$

2. $f(x) = \frac{x+2}{3-x}$, $g(x) = \frac{x^2}{x^2+1}$, $h(x) = \sqrt{2-x}$, (a) find $f \circ g \circ h$

(b) find $f^{-1} \circ h^{-1}$

3. A triangle has sides $a = 2$, $b = 3$ and angle $C = 60^\circ$. (a) Find the length of side c . (b) Find the sine of angle B .

4. (a) If $\lim_{x \rightarrow 2} \frac{f(x)-5}{x-2} = 3$, find $\lim_{x \rightarrow 2} f(x)$

(b) If $\lim_{x \rightarrow 2} \frac{f(x)-5}{x-3} = 3$, find $\lim_{x \rightarrow 2} f(x)$

5. Find the equations of lines that are tangent to the graph of $y = x^2$ and goes through the point (2,3)

6. Using the sandwich theorem(the squeeze theorem) show that $\lim_{x \rightarrow \infty} \frac{\sin x}{x} = 0$

7. Find the asymptotes of the graph of $y = \frac{x^3 + 1}{x^2 - x - 2}$

8. Find the limits

(a) $\lim_{x \rightarrow 1} \frac{\sin(1 - \sqrt{x})}{x - 1}$

(b) $\lim_{x \rightarrow -\infty} \tan^{-1} x$

(c) $\lim_{\theta \rightarrow 0} \frac{\tan 3\theta}{\sin 2\theta}$

(d) $\lim_{t \rightarrow 1^-} \frac{x(x-1)}{3|x-1|}$

(e) $\lim_{x \rightarrow 0} \frac{\sin(1 - \cos x)}{x^2}$

(f) $\lim_{h \rightarrow 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$