

國立宜蘭大學 機械與機電工程學系 一年級 102(2) 微積分二 期末考試

日期： 103 年 6 月 18 日

時間： 8:10 - 9:30

班級：

學號：

姓名：

得	
分	

1. Evaluate the integrals (48%)

(a) $\int \frac{dx}{x^2 + 2x}$

(b) $\int x\sqrt{x^2 - 4} dx$

(c) $\int \frac{dx}{x^2\sqrt{x^2 + 1}}$

(d) $\int \sin^5 \frac{x}{2} dx$

(e) $\int t^2 \cos t dt$

(f) $\int_1^4 \frac{2^{\sqrt{x}}}{\sqrt{x}} dx$

(g) $\int \frac{dx}{x \log_{10} x}$

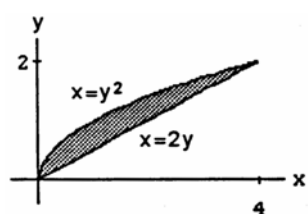
(h) $\int \ln x dx$

2. Evaluate the integral $\int \frac{x^2 - x + 2}{x^3 - 1} dx$ (10%)

3. Evaluate the integral $\int x \tan^2 x dx$ (10%)

4. Find the length of the curve $y = (x^2/8) - \ln x$, $4 \leq x \leq 8$ (10%)

5. Find the centroid of a thin, flat plate covering the region enclosed by the parabola $y^2 = x$ and the line $x = 2y$ (12%)



6. A hard-boiled egg at $98^\circ C$ is put in a sink of $18^\circ C$ water. After 5 min, the egg's temperature is $38^\circ C$. Assuming that the water has not warmed appreciably, how much longer will it take the egg to reach $20^\circ C$? [Hint: Newton's Law of Cooling $\frac{dH}{dt} = -k(H - H_s)$] (10%)