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| 國立宜蘭大學 104 學年度第 2 學期 期中 考試試題紙 | | | 第 頁 |
| 考試科目 | 班 級 | 學 號 | 姓 名 |
| 微積分二 | | | |

Multiple choices (60%)

- () Find the area of the surface formed by revolving the graph of $f(x) = \frac{x^3}{6} + \frac{1}{2x}$ on the interval $[1, 2]$ about the x-axis. (a) $47\pi/16$ (b) $3\pi/2$ (c) $\pi/2$ (d) $\pi/3$.
- () Solve the arc length of the graph of $y = \ln \cos x$ on the interval $[0, \pi/3]$. (a) $\ln(2 + \sqrt{3})$ (b) $2\ln 3$ (c) $\ln 3$ (d) $\ln(3 + \sqrt{2})$.
- () Solve the indefinite integral of $\int \sec^3 x dx$. (a) $\frac{1}{2} \sec x \tan x + \frac{1}{3} \ln|\sec x + \tan x| + C$ (b) $\frac{1}{2} \sec x \tan x + \frac{1}{3} \ln|\sec x^2 + \tan x| + C$ (c) $\frac{1}{2} \sec x \tan x - \frac{1}{2} \ln|\sec x + \tan x| + C$ (d) $\frac{1}{2} \sec x \tan x + \frac{1}{2} \ln|\sec x + \tan x| + C$.
- () Solve the indefinite integral of $\int x^2 \cos x dx$. (a) $x^2 \sin x + 2x \cos x - 2 \sin x + C$ (b) $x^2 \cos x + 2x \cos x - 2 \sin x + C$ (c) $x^2 \sin x + 2x \sin x - 2 \sin x + C$ (d) $x^2 \sin x + 2x \cos x - 2 \cos x + C$
- () Solve the indefinite integral of $\int \sin(-4x) \cos 3x dx$. (a) $\frac{\cos x}{7} + \frac{\cos 7x}{14} + C$ (b) $\frac{\cos x}{14} + \frac{\cos 7x}{7} + C$ (c) $\frac{1}{14}(\cos x + 7 \cos 7x) + C$ (d) $\frac{1}{14}(7 \cos x + \cos 7x) + C$.
- () Solve the indefinite integral of $\int \frac{2x^3 - 4x - 8}{(x^2 - x)(x^2 + 4)} dx$. (a) $\ln|x| - \ln(x^2 + 4) + 2 \arctan \frac{x}{2} + C$ (b) $2 \ln|x| - 2 \ln|x - 1| + \ln(x^2 + 4) + 2 \arctan \frac{x}{2} + C$ (c) $\ln|x| - \ln|x - 1| + 2 \ln(x^2 + 4) + C$ (d) $-2 \ln|x - 1| + \ln(x^2 + 4) + \arctan \frac{x}{2} + C$
- () Solve the definite integral of $\int_0^{\pi/4} \sec^2 t \sqrt{\tan t} dt$. (a) $2/3$ (b) 1 (c) $1/2$ (d) $1/4$.
- () Solve the definite integral of $\int_0^{\sqrt{3}/2} \frac{t^2}{(1-t^2)^{3/2}} dt$. (a) $\sqrt{3} + \pi/2$ (b) $\sqrt{3} - \pi/3$ (c) $\sqrt{3}\pi/3$ (d) $\pi/2$.
- () Solve the definite integral of $\int_{\sqrt{3}}^2 \frac{\sqrt{x^2 - 3}}{x} dx$. (a) $1 - \sqrt{3}\pi/6$ (b) $\sqrt{3} - \pi/3$ (c) $\sqrt{3}\pi/3$ (d) $\pi/2 - 1$.
- () Solve the definite integral of $\int_2^3 \frac{2x-3}{(x-1)^2} dx$. (a) $2 \ln 2 - 1/2$ (b) $2 \ln 2$ (c) $2 \ln 3$ (d) $\ln 3 - 1/2$.

Calculation (40%)

1. Evaluate the following limits: (20%)

(a) $\lim_{x \rightarrow 0} \frac{\arctan x}{\sin x}$

(b) $\lim_{x \rightarrow 1^+} \left(\frac{1}{\ln x} - \frac{1}{x-1} \right)$

2. Find the improper integral. (20%)

(a) $\int_{-1}^2 \frac{1}{x^3} dx$

(b) $\int_0^{\infty} \frac{1}{\sqrt{x(x+1)}} dx$