

THOMAS' CALCULUS (12/E)

## 8.2 Trigonometric Integrals

開課班級: (105-2) 通訊1/電機1/智財學程 微積分

授課教師: 吳漢銘 (國立臺北大學統計學系 副教授)

教學網站: <http://www.hmwu.idv.tw>

系級: \_\_\_\_\_ 學號: \_\_\_\_\_ 姓名: \_\_\_\_\_

## 1 Products of Powers of Sines and Cosines


1.1  $\int \sin^m x \cos^n x dx$

Case 1. If  $m$  is \_\_\_\_\_  $\Rightarrow m =$  \_\_\_\_\_, use \_\_\_\_\_

$$\sin^m x = \text{_____} = \text{_____} = \text{_____}$$


Case 2. If  $m$  is \_\_\_\_\_ and  $n$  is \_\_\_\_\_.  $\Rightarrow n =$  \_\_\_\_\_, use \_\_\_\_\_

$$\cos^n x = \text{_____} = \text{_____} = \text{_____}$$

Case 3. If both  $m$  and  $n$  are \_\_\_\_\_  $\Rightarrow$  use  $\sin^2 x =$  \_\_\_\_\_,  $\cos^2 x =$  \_\_\_\_\_. Ex. 1 ..... (example1, p444)


Evaluate  $\int \sin^3 x \cos^2 x dx$ .

sol:

 Ex. 2 ..... (example2, p445)

Evaluate  $\int \cos^5 x \, dx$ .

*sol:*


 Ex. 3 ..... (example3, p445)

Evaluate  $\int \sin^2 x \cos^4 x \, dx$ .

*sol:*

## 2 Eliminating Square Roots

2.1 Use  $\cos^2 \theta =$  \_\_\_\_\_

 Ex. 4 ..... (example4, p446)


Evaluate  $\int_0^{\pi/4} \sqrt{1 + \cos 4x} \, dx$ .

*sol:*

### 3 Integrals of Powers of $\tan x$ and $\sec x$


3.1 Use  $\tan^2 x =$  \_\_\_\_\_

3.2 Use  $\sec^2 x =$  \_\_\_\_\_

 **Ex. 5** ..... (example5, p446)

Evaluate  $\int \tan^4 x \, dx$ .

*sol:*

 **Ex. 6** ..... (example6, p447)

Evaluate  $\int \sec^3 x \, dx$ .


*sol:*

## 4 Products of Sine and Cosines

4.1  $\sin mx \sin nx =$  \_\_\_\_\_ .

4.2  $\sin mx \cos nx =$  \_\_\_\_\_ .

4.3  $\cos mx \cos nx =$  \_\_\_\_\_ .

 **Ex. 7** ..... (example7, p448)

Evaluate  $\int \sin 3x \cos 5x dx$ .

*sol:*

## 實習課練習 (EXERCISE 8.2)

8. 
$$\int_0^{\pi} \sin^5 \frac{x}{2} dx$$

16. 
$$\int 7 \cos^7 t dt$$

17. 
$$\int_0^{\pi} 8 \sin^4 x dx$$

22. 
$$\int_0^{\pi/2} \sin^2 2\theta \cos^3 2\theta d\theta$$

23. 
$$\int_0^{2\pi} \sqrt{\frac{1 - \cos x}{2}} dx$$

25. 
$$\int_0^{\pi} \sqrt{1 - \sin^2 t} dt$$

31. 
$$\int_0^{\pi/2} \theta \sqrt{1 - \cos 2\theta} d\theta$$

35. 
$$\int \sec^3 x \tan x dx$$

38. 
$$\int \sec^4 x \tan^2 x dx$$

53. 
$$\int_{-\pi}^{\pi} \sin 3x \sin 3x dx$$

55. 
$$\int \cos 3x \cos 4x dx$$

57. 
$$\int \sin^2 \theta \cos 3\theta d\theta$$