Math - Calculus II INTEGRATION BY PARTS

section 7.1 (Stewart) (1-36) omit 13, 14

1. Integrals involving the product of a polynomial and an exponential or trig function. (Tabular)

Examples: $\int (x+1)^2 \sin 2x\, dx$; $\int x^3 e^x\, dx$; $\int x \sin x\, dx$

Ex 7.1 : 2, 3, 4, 5, 7, 8, 10, 15, 16, 20, 22, 29-32 (substitute first), 33, 35, 36 (4^{th} edition)

2. Integrals involving logarithms or inverse trig functions

Examples: $\int \ln x\, dx$; $\int x \ln x\, dx$; $\int \arctan x\, dx$

$\int \arcsin x\, dx$; $\int \frac{\ln x}{\sqrt{x}}\, dx$; $\int x \operatorname{arcsec} x\, dx$; $\int x (\ln x)^2\, dx$

Ex 7.1 : 1, 6, 9, 17, 18, 19, 21, 23, 24, 27, 34 (4^{th} edition)

3. Integrals which "double back" to the original

Examples:

$\int e^x \sin 2x\, dx$; $\int \sin 2x \cos 5x\, dx$; $\int \sin 4x \sin 3x\, dx$

$\int \cos(\ln x)\, dx$; $\int \sec^3 x\, dx$; $\int \csc^5 x\, dx$

$\int \tan^2 x \sec x\, dx = \int \sec^3 x\, dx - \int \sec x\, dx$

Ex 7.1 : 11, 12, 25, 28 (4^{th} edition)

Ex 7.2 : 12, 34, 40, 41, 42, 43, 49

Answers:

(42) $\frac{2}{21} \sin 5x \cos 2x - \frac{5}{21} \cos 5x \sin 2x + C$

(43) $-\frac{5}{24} \sin 5\theta \cos 7\theta + \frac{7}{24} \sin 7\theta \cos 5\theta + C$

(49) $-\frac{2}{9} \sin 3x \cos 6x + \frac{1}{9} \cos 3x \sin 6x + C$

Exercise 7.1 Integration by Parts (5^{th} edition)

Case I 2-8 , 14 , 19 , 20 , 23 , 24 , 26 , 33-36 (substitute first)

Case II 1 , 9 , 10-13 , 21 , 22 , 27 , 28 , 31

Case III 15 , 16 , 29 (#41 , 42 , 43 , 51 from exercise 7.2)

Answers: from 7.2

(41) $\frac{2}{21}\sin 5x\cos 2x - \frac{5}{21}\cos 5x\sin 2x + C$

(42) $-\frac{1}{8}\sin 3x\sin x - \frac{3}{8}\cos 3x\cos x + C$

(43) $-\frac{5}{24}\sin 5\theta\cos 7\theta + \frac{7}{24}\sin 7\theta\cos 5\theta + C$

(51) $-\frac{2}{9}\sin 3x\cos 6x + \frac{1}{9}\cos 3x\sin 6x + C$