Section 7.1 ***Integration by Parts.***

Technique: $\int udv = uv - \int vdu$

Case 1: a) A product of a polynomial and exponential functions

b) A product of a polynomial and sine / cosine

c) A product of a polynomial and logarithmic functions.

Case 2: Cyclist

a) A product of exponential and sine / cosine.

b) sine or cosine of logarithmic functions.

Case 3: Integral of inverse trig or logarithmic functions.

Case 4: Reduction formulas

Ex: Integrate the following:

a) $\int (3x-5)e^{3x}dx$

b) $\int \left(3x^2 - 2x + 7\right) e^{-2x} dx$

Short cut➔ Tablet technique.

c) $\int \left(3x^3 - 2x^2 - 5\right) e^{3x+1} dx$

d) $\int \left(3x^2 - 5x + 7\right)\cos\left(2x\right)dx$

e) $\int \left(7x^3 - 5x^2 - 3x + 9\right)\ln\left(3x\right)dx$

f) $\int \left(2\sqrt[3]{x^4} + \frac{1}{x^3} + 5\sqrt{x^5} \right) \ln(4x)\, dx$

g) $\int e^{2x} \cos(5x)\, dx$

h) $\int \sin\left(\ln\left(x\right)\right)dx$

i) $\int \tan^{-1}\left(3x\right)dx$

j) $\int \sin^{-1}(5x)\,dx$

k) $\int \ln(3x)\,dx$

l) $\int \ln(3x+2)\,dx$

Ex: Prove the reduction formula: #54 of section 7.1

a) $\int \sec^n x dx = \frac{\tan x \sec^{n-2} x}{n-1} + \frac{n-2}{n-1} \int \sec^{n-2} x dx$

b) Use part (a) to evaluate $\int \sec^5 (3x) dx$