

MA 132: Discussion 3

Thursday, January 28, 2021 10:36 AM

Agenda

- u substitution (U-SUB)
- Integration By Parts (IBP)

$$u\text{-sub} \quad \int f'(g(x)) g'(x) dx$$

$$\text{Let } u = g(x) \quad \text{then } du = g'(x) dx$$

$$\int f'(u) du = f(u) + C$$

$$\text{IBP} \quad \int u dv = uv - \int v du$$

EX: Evaluate the integral:

$$(1) \int x^2 e^{-x^3} dx$$

u-sub
 $u = -x^3$

$$(10) \int x e^x dx$$

IBP

$$u = x \quad dv = e^x dx$$

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

u-sub
 $u = 1+x^2$

$$(11) \int \ln x dx$$

IBP

$$u = \ln x \quad dv = 1 dx$$

$$(3) \int \frac{1}{1+x^2} dx = \arctan x$$

$$(12) \int \cot x dx$$

$$u^2 = 4x^2$$

$$u = \sqrt{4x^2}$$

$$= 2x$$

$$(4) \int \frac{1}{1+4x^2} dx = \int \frac{1}{1+u^2} du$$

u-sub
 $u = 2x$

$$(13) \int x \ln x dx$$

IB.P

$$u = \ln x \quad dv = x dx$$

$u = 2x$

(5) $\int \frac{1}{1+2x^2} dx = \int \frac{1}{1+u^2} du$ (14) $\int x \cos x dx$
 I B P

$u = 2x^2$
 $u = \sqrt{2}x$
 $u = \sqrt{2}x^2$
 $u = 6x^2$

$u = \sqrt{2}x$

$u = x$ $dv = \cos x dx$

(6) $\int \frac{x+1}{x^2} dx = \int \frac{x}{x^2} + \frac{1}{x^2} dx$ (15) $\int \tan^{-1}(x) dx$
 I B P

$= \int \frac{1}{x} + \frac{1}{x^2} dx$ $u = \tan^{-1}x$ $dv = 1 dx$

(7) $\int (x-2)(x-3) dx$ (16) $\int \sin^{-1}(x) dx$
 I B P

$\int x^2 - 5x + 6 dx$

$u = \sin^{-1}(x)$ $dv = 1 dx$

$\int f(g(x)) g'(x) dx$

(8) $\int \sin x \sqrt{1 - \cos x} dx$

(17) $\int e^x \cos x dx$

$u = 1 - \cos x$
 $\frac{du}{dx} = \sin x$

(9) $\int \tan x dx$

(18) $\int x^5 \sqrt[3]{1+x^3} dx$

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

(25) $\int \sin^2 x \cos x dx$

(20) $\int \frac{\cos x - \sin x}{\sin x + \cos x} dx$

(26) $\int \sin x \cos^2 x dx$

(21) $\int \sin^2 x dx$

(27) $\int \sin^3 x \cos^2 x dx$

(22) $\int \cos^2 x dx$

(28) $\int \sin^3 x \cos^4 x dx$

(23) $\int \tan^2 x dx$

(29) $\int \sin^7 x \cos^3 x dx$

(24) $\int \sin x \cos x dx$

(30) $\int \sec x dx$

