

# I-A1 or I-A2a

## Practice Sols.

(NM)

1.  $\int \frac{3x^3 - x^4}{x^2} dx$

$\int \frac{3x^3}{x^2} - \frac{x^4}{x^2} dx$       rewrite

$\int 3x - x^2 dx$       simplify       $\frac{x^a}{x^b} = x^{a-b}$

$3 \frac{x^2}{2} - \frac{x^3}{3} + C$       integrate:  $\int x^n dx = \frac{x^{n+1}}{n+1} + C$

$\frac{3}{2}x^2 - \frac{1}{3}x^3 + C$

2.  $\int -\cos(x) dx$

$\frac{d}{dx} \sin(x) = \cos(x)$

∴  $\int \cos(x) dx = \sin x$

$= -\sin(x) + C$

3.  $\int x(2x+1)^2 dx$

$\int x(2x+1)(2x+1) dx$       • expand

$\int x(4x^2 + 4x + 1) dx$       • "foil" / distribute / etc

$\int 4x^3 + 4x^2 + x dx$       • distribute

$4 \cdot \frac{x^4}{4} + 4 \cdot \frac{x^3}{3} + \frac{x^2}{2} + C$

$x^4 + \frac{4}{3}x^3 + \frac{1}{2}x^2 + C$

$$4. \int \frac{1}{\sqrt[4]{x^7}} dx \quad \cdot \quad \sqrt[n]{x^a} \Rightarrow x^{a/n}$$

$$\int \frac{1}{x^{7/4}} dx$$

$$\int x^{-7/4} dx \quad \cdot \quad \frac{1}{x^n} \Rightarrow x^{-n}$$

$$\frac{x^{-3/4}}{-3/4} + C$$

• Rev. Power Rule

$$-\frac{4}{3} x^{-3/4} + C$$

$$\frac{-4}{3x^{3/4}} + C$$

$$5. \int 2e^x dx = \boxed{2e^x + C} \quad \text{!!}$$

Be sure you know all these rules:

$$\int x^n dx$$

$$\int \frac{1}{x} dx$$

$$\int \cos x dx$$

$$\int e^x dx$$

$$\int \sin x dx$$

$$\int \tan x dx$$

$$\int \sec^2 x dx$$

$$\int \cot x dx$$

$$\int \sec x \tan x dx$$

$$\int \sec x dx$$

$$\int \csc^2 x dx$$

$$\int \csc x dx$$

$$\int \csc x \cot x dx$$

$$6. \int x \sqrt{4-x^2} dx$$

$$\int x (4-x^2)^{1/2} dx$$

Need:  
-2x

$$-\frac{1}{2} \int 2x (4-x^2)^{1/2} dx$$

$$-\frac{1}{2} \int (4-x^2)^{1/2} dx$$

$$-\frac{1}{2} \left[ \frac{(4-x^2)^{3/2}}{3/2} + C \right]$$

$$-\frac{1}{2} \cdot \frac{2}{3} (4-x^2)^{3/2} + C$$

$$-\frac{1}{3} (4-x^2)^{3/2} + C$$

rewrite  $\sqrt[n]{x} = x^{1/n}$

Rev. chain rule

$$\int g'(x) \cdot f(g(x)) dx = f(g(x)) + C$$

Rev. Power rule

(E)

$$7.) \int \frac{x}{\sqrt{3x^2+5}} dx = \int x \cdot \frac{1}{(3x^2+5)^{1/2}} dx = \int x (3x^2+5)^{-1/2} dx$$

Need:  
6x

$$\frac{1}{6} \int 6x (3x^2+5)^{-1/2} dx$$

$$\frac{1}{6} \left[ \frac{(3x^2+5)^{1/2}}{1/2} + C \right]$$

$$\frac{1}{6} \cdot [2 (3x^2+5)^{1/2} + C]$$

$$\frac{1}{3} (3x^2+5)^{1/2} + C$$

(D)