1/ x^4+C 2/ $\frac{x^6}{6}+C$ 3/ x^3+2x^2-2x+C

4/ $x^4+\frac{7}{3}x^3-3x^2+x+C$

5/ $\frac{3}{5}x^{5/3}+\frac{3}{4}x^{4/3}+\frac{4}{3}x^3+C$

6/ $\sin x+x+C$ $(\cos x)^{-2}\,du$ $u^{\wedge}$?

7/ $\tan x+C$ $\frac{1}{(\cos x)^2}=\sec^2 x$

8/ $-\cos x-\frac{x^2}{2}+C$ 9/ $3t^4+3t$

$\frac{3}{5}x^5+\frac{3}{2}t^2+C$

10/ $x^{3/2}$

$\frac{2}{5}x^{5/2}+C$

11/ $3(9x^2+6x+1)$ $\Longrightarrow$ $du\cdot u^n$ $3(3x+1)^2$

$27x^2+18x+3$ $\frac{1}{3}(3x+1)^3+C$

$=9x^3+9x^2+3x+C$

12/ $3t(t^6+8t^3+16)$

$3t^7+24t^4+48t$

$=\frac{3}{8}t^8+\frac{24}{5}t^5+24t^2+C$

13/ $3x^2-2x+1$

$=x^3-x^2+x+C$

14/ $3x^{-1/2}+x^2-x^3$

$=6x^{1/2}+\frac{x^3}{3}-\frac{x^4}{4}+C$

15/ $x^3(3x^2+5x+2)$

$3x^5+5x^4+2x^3$

$=\frac{1}{2}x^6+x^5+\frac{1}{2}x^4+C$

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

$f(x) = \dfrac{x^3}{\sqrt{1-4x^4}}$ $\int \dfrac{du}{\sqrt{1-u^2}}$ $f(x) = \dfrac{-x^2 \sec^2 x^3}{\sqrt{1-\tan^2 x^3}}$

$f(x) = \frac{1}{16}\left(1-4x^4\right)^{-\frac{1}{2}}(16x^3)$

$u^n \cdot du \leftarrow$ chain Rule

$F(x) = -\frac{1}{8}\left(1-4x^4\right)^{\frac{1}{2}} + C$

$= -\dfrac{\sec^2 x^3 (3x^2)}{3\sqrt{1-(\tan x^3)^2}}$

$= -\frac{1}{3}\sin^{-1}(\tan x^3) + C$

OR

$= \frac{1}{3}\cos^{-1}\tan x^3 + C$

Antiderivatives involving logarithms and exponential functions...

Remember the following derivative rules...

$$f(x)=\ln[g(x)]$$

$$f'(x)=\frac{1}{g(x)}g'(x)$$

$$f(x)=e^{g(x)}$$

$$f'(x)=e^{g(x)}\bullet g'(x)$$

Examples:

(1) $f'(x)=\dfrac{2}{7x}$

(2) $f'(x)=\dfrac{x^2}{x^3+1}$

(3) $f'(x)=\dfrac{-5\sec^2 3x}{\tan 3x}$

(4) $f'(x)=\tan 7x$

(5) $f'(x) = 3xe^{5x^2}$

$f'(x) = \frac{3}{10} e^{5x^2}(10x)$

$= \frac{3}{10} e^{5x^2} + C$

$x^{1/2} \Rightarrow \frac{1}{2} x^{-1/2}$

(6) $f'(x) = 7x^2 e^{x^3}$

$f'(x) = \frac{7}{3} e^{x^3} 3x^2$

$= \frac{7}{3} e^{x^3} + C$

(7) $f'(x) = \frac{e^{\sqrt{x}}}{\sqrt{x}}$

$f'(x) = 2e^{\sqrt{x}} \frac{1}{2} x^{-\frac{1}{2}}$

$f(x) = 2e^{\sqrt{x}} + C$

(8) $f'(x) = \csc 5x \cot 5x \left(e^{\csc 5x}\right)$

$f'(x) = \frac{1}{5} e^{\csc 5x}(-\csc 5x \cot 5x (5))$

$f(x) = -\frac{1}{5} e^{\csc 5x} + C$