

## INTEGRALS OF THE FORM $f'(ax + b)$

The following are integrals that you should know:


$\int x^n dx$	=	$\frac{x^{n+1}}{n+1} + c$
$\int e^x dx$	=	$e^x + c$
$\int \frac{1}{x} dx$	=	$\ln x  + c$
$\int \cos x dx$	=	$\sin x + c$
$\int \sin x dx$	=	$-\cos x + c$
$\int \sec^2 x dx$	=	$\tan x + c$
$\int \operatorname{cosec} x \cot x dx$	=	$-\operatorname{cosec} x + c$
$\int \operatorname{cosec}^2 x dx$	=	$-\cot x + c$
$\int \sec x \tan x dx$	=	$\sec x + c$

## SKILL #2: Integrating $f(ax + b)$

Therefore:

$$\frac{d}{dx}(\sin(3x + 1)) = \boxed{\phantom{000}}$$

$$\int \cos(3x + 1) dx = \boxed{\phantom{000}}$$

 For any expression where inner function is  $ax + b$ , integrate as before and  $\div a$ .

$$\int f'(ax + b) dx = \frac{1}{a} f(ax + b) + C$$

Quickfire:

$$\int e^{3x} dx = \boxed{\phantom{000}}$$

$$\int \frac{1}{5x + 2} dx = \boxed{\phantom{000}}$$

$$\int 2\sec^2(3x - 2) dx = \boxed{\phantom{000}}$$

$$\int (3x + 4)^3 dx = \boxed{\phantom{000}}$$

$$\int \sin(1 - 5x) dx = \boxed{\phantom{000}}$$

$$\int \frac{1}{3(4x - 2)^2} dx = \boxed{\phantom{000}}$$

Fro Tip: For  $\int (ax + b)^n dx$ , ensure you divide by the  $(n + 1)$  and the  $a$   $\rightarrow$

$$\int (10x + 11)^{12} dx = \boxed{\phantom{000}}$$

# Check Your Understanding

$$\int e^{3x+1} dx = \boxed{\phantom{000000}}$$

$$\int \frac{1}{1-2x} dx = \boxed{\phantom{000000}}$$

$$\int (4-3x)^5 dx = \boxed{\phantom{000000}}$$

$$\int \sec(3x) \tan(3x) dx = \boxed{\phantom{000000}}$$

## Exercise 11B

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1 a  $\int \sin(2x+1) dx = \boxed{\phantom{000000}}$

c  $\int 4e^{x+5} dx = \boxed{\phantom{000000}}$

e  $\int \operatorname{cosec}^2 3x dx = \boxed{\phantom{000000}}$

f  $\int \sec 4x \tan 4x dx = \boxed{\phantom{000000}}$

g  $\int 3 \sin\left(\frac{1}{2}x+1\right) dx = \boxed{\phantom{000000}}$

h  $\int \operatorname{cosec} 2x \cot 2x dx = \boxed{\phantom{000000}}$

2 a  $\int e^{2x} - \frac{1}{2} \sin(2x-1) dx$   
 $= \boxed{\phantom{000000}}$

b  $\int (e^x + 1)^2 dx = \boxed{\phantom{000000}}$

c  $\int \sec^2 2x (1 + \sin 2x) dx = \boxed{\phantom{000000}}$

d  $\int \frac{3-2 \cos\left(\frac{1}{2}x\right)}{\sin^2\left(\frac{1}{2}x\right)} dx = \boxed{\phantom{000000}}$

e  $\int e^{3-x} + \sin(3-x) + \cos(3-x) dx$   
 $= \boxed{\phantom{000000}}$

3 a  $\int \frac{1}{2x+1} dx = \boxed{\phantom{000000}}$

b  $\int \frac{1}{(2x+1)^2} dx = \boxed{\phantom{000000}}$

c  $\int (2x+1)^2 dx = \boxed{\phantom{000000}}$

d  $\int \frac{3}{4x-1} dx = \boxed{\phantom{000000}}$

f  $\int \frac{3}{(1-4x)^2} dx = \boxed{\phantom{000000}}$

h  $\int \frac{3}{(1-2x)^3} dx = \boxed{\phantom{000000}}$

j  $\int \frac{5}{3-2x} dx = \boxed{\phantom{000000}}$

4 a  $\int 3 \sin(2x+1) + \frac{4}{2x+1} dx$   
 $= \boxed{\phantom{000000}}$

c  $\int \frac{1}{\sin^2 2x} + \frac{1}{1+2x} + \frac{1}{(1+2x)^2} dx$   
 $= \boxed{\phantom{000000}}$