Differentiation	Integration
$\frac{d}{dx} ax^n = nax^{n-1}$	$\int ax^n dx = \frac{ax^{n+1}}{n+1} + c$
$\frac{d}{dx} \ln x = \frac{1}{x}$	$\int \frac{1}{x} dx = \ln\lvert x\rvert + c$
$\frac{d}{dx} \ln(f(x)) = \frac{f'(x)}{f(x)}$	$\int \frac{f'(x)}{f(x)} dx = \ln(f(x)) + c$
$\frac{d}{dx} ae^x = ae^x$	$\int ae^x dx = ae^x + c$
$\frac{d}{dx} \sin x = \cos x$	$\int \cos x \, dx = \sin x + c$
$\frac{d}{dx} \cos x = -\sin x$	$\int \sin x \, dx = -\cos x + c$
$\frac{d}{dx} \tan x = \sec^2 x$	$\int \sec^2 x \, dx = \tan x + c$
$\frac{d}{dx} \sin ax = a\cos ax$	$\int \cos ax \, dx = \frac{1}{a}\sin ax + c$
$\frac{d}{dx} \cos ax = -a\sin ax$	$\int \sin ax \, dx = -\frac{1}{a}\cos ax + c$

Exercise 11 A

1) a) $\int\left(3\sec^2 x + \frac{5}{x} + \frac{2}{x^2}\right)dx = \int\left(3\sec^2 x + \frac{5}{x} + 2x^{-2}\right)dx$

$= 3\tan x + 5\ln|x| - \frac{2}{x} + c$

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c) $\int 2(\sin x - \cos x + x)\,dx$

$= 2\left(-\cos x - \sin x + \frac{x^2}{2}\right) + c$

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e) $\int\left(5e^x + 4\cos x - \frac{2}{x^2}\right)dx$

$= \int\left(5e^x + 4\cos x - 2x^{-2}\right)dx$

$= 5e^x + 4\sin x + 2x^{-1} + c$

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g) $\int\left(\frac{1}{x} + \frac{1}{x^2} + \frac{1}{x^3}\right)dx$

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

$= \ln|x| + \frac{x^{-1}}{-1} + \frac{x^{-2}}{-2} + c$

$= \ln|x| - \frac{1}{x} - \frac{1}{2x^2} + c$

1b) $\int (5e^x - 4\sin x + 2x^3)\,dx$

$= 5e^x + 4\cos x + \frac{x^4}{2} + c$

1d) $\int \left(3\sec x \tan x - \frac{2}{x}\right)dx$

$= 3\sec x - 2\ln|x| + c$

1f) $\int \left(\frac{1}{2x} + 2\operatorname{cosec}^2 x\right)dx$

$= \frac{1}{2}\ln|x| - 2\cot x + c$

1h) $\int (e^x + \sin x + \cos x)\,dx$

$= e^x - \cos x + \sin x + c$

1j) $\int \left(e^x + \frac{1}{x} - \operatorname{cosec}^2 x\right)dx$

$= e^x + \ln|x| + \cot x + c$

Hwk - Video lesson on Integration by Substitution
Print lesson notes, do exercise and self-mark