BASIC DIFFERENTIATION FORMULAS

$(c)' = 0$
$(x^n)' = nx^{n-1}$
$(a^x)' = a^x \ln a$, in particular $(e^x)' = e^x$
$(\log_a x)' = \frac{1}{xlna}$, in particular $(\ln x)' = \frac{1}{x}$
$(\sin x)' = \cos x$
$(\cos x)' = -\sin x$
$(\tan x)' = \sec^2 x = \frac{1}{\cos^2 x}$
$(\cot x)' = -\csc^2 x = -\frac{1}{\sin^2 x}$
$(\arcsin x)' = \frac{1}{\sqrt{1-x^2}}$
$(\arccos x)' = -\frac{1}{\sqrt{1-x^2}}$
$(\arctan x)' = \frac{1}{1+x^2}$
$(\mathrm{arccot} x)' = -\frac{1}{1+x^2}$

Properties of derivatives:

$(u \pm v)' = u' \pm v'$
$(cu)' = cu'$
$(uv)' = u'v + uv'$
$(\frac{u}{v})' = \frac{u'v-uv'}{v^2}$
$(f(u(x)))' = f'(u)u'(x)$ (the **chain rule**)

Here $\arcsin x = \sin^{-1} x$, $\arccos x = \cos^{-1} x$, $\arctan x = \tan^{-1} x$, and $\mathrm{arccot} x = \cot^{-1} x$

BASIC INTEGRATION FORMULAS

$\int dx = x + c$
$\int x^n dx = \frac{x^{n+1}}{n+1} + c \ (n \neq -1)$
$\int \frac{dx}{x} = \ln|x| + c$
$\int a^x dx = \frac{a^x}{\ln a} + c,$ in particular
$\int e^x dx = e^x + c$
$\int \sin x dx = -\cos x + c$
$\int \cos x dx = \sin x + c$
$\int \sec^2 x dx = \tan x + c$
$\int \csc^2 x dx = -\cot x + c$
$\int \frac{dx}{\sqrt{a^2 - x^2}} = \arcsin \frac{x}{a} + c$
$\int \frac{dx}{\sqrt{x^2 \pm a^2}} = \ln|x + \sqrt{x^2 \pm a^2}| + c$
$\int \frac{dx}{a^2 + x^2} = \frac{1}{a} \arctan \frac{x}{a} + c$
$\int cf(x)dx = c \int f(x)dx$
$\int (f(x) + g(x))dx = \int f(x)dx + \int g(x)dx$

Substitution:
if $\int f(x)dx = F(x) + c$, then
$\int f(u(x))u'(x)dx = F(u(x)) + c$

Integration by parts:
$\int uv'dx = uv - \int u'vdx$
or $\int udv = uv - \int vdu$