Table of integrals to remember. The $+C$ is omitted everywhere.

\[ \int x^\alpha \, dx = \frac{1}{\alpha+1} x^{\alpha+1} \quad \text{for all real numbers } \alpha \neq -1. \]
\[ \int x^{-1} \, dx = \ln |x|. \]
\[ \int e^x \, dx = e^x. \]
\[ \int a^x \, dx = \frac{1}{\ln a} a^x. \]
\[ \int \ln(x) \, dx = x \ln x - x. \]
\[ \int \sin(x) \, dx = -\cos(x); \]
\[ \int \cos(x) \, dx = \sin(x). \]
\[ \int \frac{1}{\sqrt{1-x^2}} = \sin^{-1}(x) \]
\[ \int \frac{1}{1+x^2} = \tan^{-1}(x) \]
\[ \frac{1}{x^2-a^2} = \frac{1}{2a} (\ln |x-a| - \ln |x+a|) = \frac{1}{2a} \ln \left( \frac{|x-a|}{|x+a|} \right). \]

Note: if in the trigonometric integrals above, instead of $1-x^2$ or $1+x^2$ you have $a^2-x^2$ or $a^2+x^2$, then use the substitution $u = x/a$; if you have some other quadratic polynomial, then complete the square, and reduce it to $a^2-x^2$, $a^2+x^2$, or $x^2-a^2$.

Also, remember the following basic techniques:

- substitution.
- For expressions such as $x^n \ln x$ or $x^n e^x$, or $x^n \sin(x)$, $x^n \cos(x)$, use integration by parts.
- The startegy for integrating $\sin^n(x) \cos^m(x) \, dx$ is to make a substitution $u = \cos(x)$ or $u = \sin(x)$ (use the function whose power is odd); if both powers are even, use double-angle formulas to reduce to smaller powers of the functions of $2x$.

The main double angle formula:

\[ \cos(2x) = \cos^2 x - \sin^2 x = 2 \cos^2 x - 1. \]

Then $\cos^2 x = \frac{\cos(2x)+1}{2}$. 

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