Throughout this document, the variable of integration is denoted by u because many times one does a u-substitution to transform the integral into one of these forms. If your integral does not look **exactly** like one of these integrals (perhaps with some constants out in front of the integral or a different variable), you should either do a substitition, integration by parts, or, in the case of rational functions, partial fractions.

1 Integrals you *need* to know

- $\displaystyle\int u^n \, du = \frac{u^{n+1}}{n+1} + C$

  Valid for $n \neq -1$. u must be in the numerator (i.e. $\frac{1}{u^n}$ doesn't cut it)

- $\displaystyle\int \frac{1}{u} \, du = \ln|u| + C$

  Absolute values are crucial when integrating over a region involving negative numbers.

- $\displaystyle\int e^{ku} \, du = \frac{1}{k} e^{ku} + C$

  k is any *constant*, e.g. $k = 1$, $k = \pi$, or $k = -2$.

- $\displaystyle\int \sin u \, du = -\cos u + C$

- $\displaystyle\int \cos u \, du = \sin u + C$

- $\displaystyle\int \sec^2 u \, du = \tan u + C$

- $\displaystyle\int \csc u \cot u \, du = -\csc u + C$

- $\displaystyle\int \sec u \tan u \, du = \sec u + C$

- $\displaystyle\int \csc^2 u \, du = -\cot u + C$

  For these last six integrals, it may be easier to remember the corresponding derivatives, i.e. the derivative of $\tan u$ is $\sec^2 u$, therefore the integral of $\sec^2 u$ is $\tan u$.

2 Integrals you should *probably* know

If you're running out of room in your brain to cram integrals into, you can either do these on the fly or take a gamble and hope you don't need them for the exam.

- $\int \tan u \; du = -\ln|\cos u| + C$
- $\int \cot u \; du = \ln|\sin u| + C$

  The trick for the previous two integrals is to write the integrand as $\frac{\sin u}{\cos u}$ (respectively, $\frac{\cos u}{\sin u}$) and do a substitution. In both cases, you should call the denominator your substitution variable.
- $\int \sec u \; du = \ln|\sec u + \tan u| + C$
- $\int \csc u \; du = \ln|\csc u - \cot u| + C$

  For the trick to do these last two, see page 259 in your textbook.