

## Section 5.5 part C: Templates

In each substitution problem, we convert the original integral into something recognizable. That ‘something’ is an integral template. These templates are already familiar to us. We wrote them using an  $x$  earlier, but the standard approach is to use a  $u$  to acknowledge the idea that we might need to use a substitution. Think of a template as a target to aim for when setting up the substitution. Sometimes, the target is obvious, but sometimes it requires a bit of thought. In particular, it can be tricky at times to decide between  $\frac{1}{u}$  and  $\frac{1}{1+u^2}$ .

The templates are

$$\begin{aligned}\int u^n du &= \frac{u^{n+1}}{n+1} + c \\ \int \sin u du &= -\cos u + c \\ \int \cos u du &= \sin u + c \\ \int \sec^2 u du &= \tan u + c \\ \int \sec u \tan u du &= \sec u + c \\ \int \csc^2 u du &= -\cot u + c \\ \int \csc u \cot u du &= -\csc u + c \\ \int \frac{1}{1+u^2} du &= \tan^{-1} u + c \\ \int \frac{1}{\sqrt{1-u^2}} du &= \sin^{-1} u + c \\ \int \frac{1}{u} du &= \ln |u| + c \\ \int e^u du &= e^u + c \\ \int \sinh u du &= \cosh u + c \\ \int \cosh u du &= \sinh u + c\end{aligned}$$