Basic Integration Techniques

To actually find an antiderivative we need to use the following rule.

Power Rule for Antiderivatives

If $n \neq -1$ then the most general antiderivative of x^n is $\frac{1}{n+1}x^{n+1}+C$, where *C* is an arbitrary constant.

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C \qquad \text{provided } n \neq -1 \text{ (to avoid division by zero)}$$

Example 1: Find the most general antiderivative of $f'(x) = x^2$.

Using the power rule for antiderivatives we obtain: $f(x) = \frac{1}{2+1}x^{2+1} = \frac{1}{3}x^3 + C$

Rule 1: Let *k* and *C* be constants, then:

1) $\int k \, dx = kx + C$
2) $\int k \, f(x) \, dx = k\int f(x) \, dx$
3) $\int [f(x) \pm g(x)]dx = \int f(x)dx \pm \int g(x)dx$