

## Integration Review Sheet

Integration Rule:	Example:
$\int k \cdot dx = k \cdot x + c$	$\int 5dx = 5x + c$ When $k = 1$ $\int dx = x + c$
$\int x^n dx = \frac{x^{n+1}}{n+1} + c, \quad n \neq -1$	$\int x^3 dx = \frac{x^{3+1}}{3+1} + c$ $= \frac{x^4}{4} + c$
$\int \frac{k}{x} dx = k \ln x  + c$	$\int \frac{3}{x} dx = 3 \ln x  + c$
$\int a^x dx = \frac{1}{\ln a} a^x + c$	$\int 2^x dx = \frac{1}{\ln 2} 2^x + c$
$\int e^{kx} dx = \frac{e^{kx}}{k} + c$	$\int e^{5x} dx = \frac{e^{5x}}{5} + c$
$\int k \cdot f(x) dx = k \cdot \int f(x) dx$	$\int 15x^3 dx = 15 \cdot \int x^3 dx$ $= 15 \frac{x^4}{4} + c = \frac{15x^4}{4} + c$
$\int [f(x) \pm g(x)] dx = \int f(x) dx \pm \int g(x) dx$	$\int \left( x^2 + \frac{1}{x} \right) dx = \int x^2 dx + \int \frac{1}{x} dx$ $= \frac{x^3}{3} + \ln x  + c$

### More Examples:

$\int \frac{1}{x+2} dx = \ln x+2  + c$	$\int \frac{x^3 - 3}{x^2} dx = \int \left( \frac{x^3}{x^2} - \frac{3}{x^2} \right) dx$ $= \int \frac{x^3}{x^2} dx - \int \frac{3}{x^2} dx$ $= \int x dx - 3 \int x^{-2} dx$ $= \frac{x^2}{2} - 3 \left( \frac{x^{-1}}{-1} \right) + c$ $= \frac{x^2}{2} + \frac{3}{x} + c$ $= \frac{1}{2} x^2 + 3x^{-1} + c$
$\int 5x^7 dx = 5 \int (x^7) dx = 5 \frac{x^8}{8} + c = \frac{5}{8} x^8 + c$	
$\int (4x^3 + 2x - 1) dx = \int (4x^3) dx + \int (2x) dx - \int dx$ $= 4 \int x^3 dx + 2 \int x dx - \int dx$ $= 4 \cdot \frac{x^4}{4} + 2 \cdot \frac{x^2}{2} - x + c$ $= x^4 + x^2 - x + c$	