

# Integration

To integrate: Add one to the power and divide by the new power. When integrating always add a constant,

$$c$$

$$c$$

$$4x^3$$

integrated is

$$4x^3$$

$$\int 4x^3 dx = \frac{4x^{3+1}}{3+1} + c = x^4 + c$$

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The

$$\int$$

symbol means integrate and the

$$\int$$

$$dx$$

above means integrate with respect to

$$dx$$

$$x$$

$$x$$

We can integrate a sum using the same rule for each term.

$$2x^5 - 4x^7$$

when integrated is

$$2x^5 - 4x^7$$

$$\int 2x^5 - 4x^7 dx = \frac{2x^{5+1}}{5+1} - \frac{4x^{7+1}}{7+1} + c = \frac{x^6}{3} - \frac{x^8}{2} + c$$

$$\int 2x^5 - 4x^7 dx = \frac{2x^{5+1}}{5+1} - \frac{4x^{7+1}}{7+1} + c = \frac{x^6}{3} - \frac{x^8}{2} + c$$

This rule 'add one to the power and divide by the new power' works for

$$x$$

's and constants too.

To integrate

$$3x$$

write as

$$3x^1$$

then apply the rule to give

$$\frac{3x^1}{x} dx = \frac{3x^{1+1}}{1+1} + c = \frac{3x^2}{2} + c$$

To integrate

$$4x^0$$

write as

$$4x^0$$

then integrate using the above gives

$$\int 4x^0 dx = \frac{4x^{0+1}}{0+1} + c = 4x + c$$

Integrate

$$4x^2 - 6x - 4$$

Write

$$4x^2 - 6x^1 - 4x^0$$

We have

$$\begin{aligned} \int 4x^2 - 6x^1 - 4x^0 dx &= \frac{4x^{2+1}}{2+1} - \frac{6x^{1+1}}{1+1} - \frac{4x^{0+1}}{0+1} + c \\ &= \frac{4x^3}{3} - 3x^2 - 4x + c \end{aligned}$$