amsmath package

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1 Section 1

You have to wrap you equation in the equation environment if you want it to be numbered, use equation* (with an asterisk) otherwise. Inside the equation environment use the split environment to split the equations into smaller pieces, these smaller pieces will be aligned accordingly. The double backslash works as a newline character. Use the ampersand character &, to set the points where the equations are vertically aligned.

$$\begin{aligned} A &= \frac{\pi r^2}{2} \\ &= \frac{1}{2}\pi r^2 \end{aligned}$$

2 Writing a single equation

$$e^{\pi i} - 1 = 0 \tag{1}$$

The beautiful equation 1 is known as the Euler equation.

3 Displaying long equations

$$p(x) = 3x^6 + 14x^5y + 590x^4y^2 + 19x^3y^3 \\ - 12x^2y^4 - 12xy^5 + 2y^6 - a^3b^3$$

4 Aligning several equations

$$2x - 5y = 8 \tag{2}$$
$$3x + 9y = -12 \tag{3}$$

5 Aligning multiple equations

$$\begin{aligned} x &= y & w &= z & a &= b + c \\ 2x &= -y & 3w &= \frac{1}{2}z & a &= b \\ -4 + 5x &= 2 + y & w + 2 &= -1 + w & ab &= cb \end{aligned}$$

6 Grouping and centering equations

$$\begin{aligned} 2x - 5y &= 8 \\ 3x^2 + 9y &= 3a + c \end{aligned}$$