

In[1]:= **Solve**[**x x + b x + c == 0, x]**

Out[1]= $\left\{ \left\{ x \rightarrow \frac{1}{2} (-b - \sqrt{b^2 - 4c}) \right\}, \left\{ x \rightarrow \frac{1}{2} (-b + \sqrt{b^2 - 4c}) \right\} \right\}$

In[2]:= **Solve**[**x x x + a x x + b x + c == 0, x]**

Out[2]= $\left\{ \left\{ x \rightarrow -\frac{a}{3} - (2^{1/3} (-a^2 + 3b)) \left/ \left(3 \left(-2a^3 + 9ab + \sqrt{4(-a^2 + 3b)^3 + (-2a^3 + 9ab - 27c)^2} - 27c \right)^{1/3} \right) + \frac{1}{3 \cdot 2^{1/3}} \left(\left(-2a^3 + 9ab + \sqrt{4(-a^2 + 3b)^3 + (-2a^3 + 9ab - 27c)^2} - 27c \right)^{1/3} \right) \right\}, \left\{ x \rightarrow -\frac{a}{3} + \left((1 + i\sqrt{3}) (-a^2 + 3b) \right) \left/ \left(3 \cdot 2^{2/3} \left(-2a^3 + 9ab + \sqrt{4(-a^2 + 3b)^3 + (-2a^3 + 9ab - 27c)^2} - 27c \right)^{1/3} \right) - \frac{1}{6 \cdot 2^{1/3}} \left((1 - i\sqrt{3}) \left(-2a^3 + 9ab + \sqrt{4(-a^2 + 3b)^3 + (-2a^3 + 9ab - 27c)^2} - 27c \right)^{1/3} \right) \right\}, \left\{ x \rightarrow -\frac{a}{3} + \left((1 - i\sqrt{3}) (-a^2 + 3b) \right) \left/ \left(3 \cdot 2^{2/3} \left(-2a^3 + 9ab + \sqrt{4(-a^2 + 3b)^3 + (-2a^3 + 9ab - 27c)^2} - 27c \right)^{1/3} \right) - \frac{1}{6 \cdot 2^{1/3}} \left((1 + i\sqrt{3}) \left(-2a^3 + 9ab + \sqrt{4(-a^2 + 3b)^3 + (-2a^3 + 9ab - 27c)^2} - 27c \right)^{1/3} \right) \right\} \right\}$

In[3]:= **Solve**[**x x x x + a x x x + b x x + c x + d == 0, x]**

Out[3]= $\left\{ \left\{ x \rightarrow -\frac{a}{4} - \frac{1}{2} \sqrt{\left(\frac{a^2}{4} - \frac{2b}{3} + (2^{1/3} (b^2 - 3ac + 12d)) \right) \left/ \left(3 \left(2b^3 - 9abc + 27c^2 + 27a^2d - 72bd + \sqrt{(-4(b^2 - 3ac + 12d)^3 + (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd)^2)} \right)^{1/3} \right) + \frac{1}{3 \cdot 2^{1/3}} \left(\left(2b^3 - 9abc + 27c^2 + 27a^2d - 72bd + \sqrt{(-4(b^2 - 3ac + 12d)^3 + (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd)^2)} \right)^{1/3} \right) \right\} - \frac{1}{2} \sqrt{\left(\frac{a^2}{2} - \frac{4b}{3} - (2^{1/3} (b^2 - 3ac + 12d)) \right) \left/ \left(3 \left(2b^3 - 9abc + 27c^2 + 27a^2d - 72bd + \sqrt{(-4(b^2 - 3ac + 12d)^3 + (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd)^2)} \right)^{1/3} \right) - \frac{1}{3 \cdot 2^{1/3}} \left(\left(2b^3 - 9abc + 27c^2 + 27a^2d - 72bd + \sqrt{(-4(b^2 - 3ac + 12d)^3 + (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd)^2)} \right)^{1/3} \right) - (-a^3 + 4ab - 8c) \right\} \left/ \left(4 \sqrt{\left(\frac{a^2}{4} - \frac{2b}{3} + (2^{1/3} (b^2 - 3ac + 12d)) \right) \left/ \left(3 \left(2b^3 - 9abc + 27c^2 + 27a^2d - 72bd + \sqrt{(-4(b^2 - 3ac + 12d)^3 + (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd)^2)} \right)^{1/3} \right) + \frac{1}{3 \cdot 2^{1/3}} \left(\left(2b^3 - 9abc + 27c^2 + 27a^2d - 72bd + \sqrt{(-4(b^2 - 3ac + 12d)^3 + (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd)^2)} \right)^{1/3} \right) \right) \right\} \right\}$

$$\begin{aligned} & \frac{1}{2} \sqrt{\left(\frac{a^2}{2} - \frac{4b}{3} - (2^{1/3} (b^2 - 3ac + 12d))\right) / \left(3 (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd) \right.} \\ & \quad \left. d + \sqrt{(-4 (b^2 - 3ac + 12d)^3 + (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd)^2)}\right)^{1/3}} - \\ & \quad \frac{1}{3 \cdot 2^{1/3}} \left((2b^3 - 9abc + 27c^2 + 27a^2d - 72bd + \sqrt{(-4 (b^2 - 3ac + 12d)^3 + \right.} \\ & \quad \left. (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd)^2)}\right)^{1/3} + (-a^3 + 4ab - 8c) / \\ & \quad \left(4 \sqrt{\left(\frac{a^2}{4} - \frac{2b}{3} + (2^{1/3} (b^2 - 3ac + 12d))\right) / \left(3 (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd) \right. \right.} \\ & \quad \left. \left. \sqrt{(-4 (b^2 - 3ac + 12d)^3 + (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd)^2)}\right)^{1/3}} + \right. \\ & \quad \left. \frac{1}{3 \cdot 2^{1/3}} \left((2b^3 - 9abc + 27c^2 + 27a^2d - 72bd + \sqrt{(-4 (b^2 - 3ac + 12d)^3 + \right.} \right. \right. \\ & \quad \left. \left. \left. (2b^3 - 9abc + 27c^2 + 27a^2d - 72bd)^2)}\right)^{1/3} \right) \right) \right) \end{aligned}$$

In[4]:= **Solve[xxxxx + axxxx + bxxx + cxx + dx + e == 0, x]**

Out[4]= {{x → Root[e + d #1 + c #1² + b #1³ + a #1⁴ + #1⁵ &, 1]},
{x → Root[e + d #1 + c #1² + b #1³ + a #1⁴ + #1⁵ &, 2]},
{x → Root[e + d #1 + c #1² + b #1³ + a #1⁴ + #1⁵ &, 3]},
{x → Root[e + d #1 + c #1² + b #1³ + a #1⁴ + #1⁵ &, 4]},
{x → Root[e + d #1 + c #1² + b #1³ + a #1⁴ + #1⁵ &, 5]}}