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$$(a+b)^3 = a^3 + b^3 + 3ab(a+b) \quad \therefore x = p^{1/3} - p^{-1/3}$$

$$x = p^{1/3} - p^{-1/3}$$

taking cube on both side

$$x^3 = (p^{1/3} - p^{-1/3})^3$$

$$a = p^{1/3}, b = p^{-1/3}$$

$$x^3 = (p^{1/3})^3 - (p^{-1/3})^3 - 3(p^{1/3})(p^{-1/3})(p^{1/3} - p^{-1/3})$$

$$x^3 = p - p^{-1} - 3p^{1/3-1/3}(x)$$

$$x^3 = p - \frac{1}{p} - 3(1)(x)$$

$$x^3 = p - \frac{1}{p} - 3x$$

$$x^3 + 3x = p - \frac{1}{p}$$