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Question 115. Determine whether the given quadratic equation has roots. If

so find the roots of $p(x) = \frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}$

Answer 115.

$$\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}$$

$$\frac{x+2+2x+2}{x^2+3x+2} = \frac{4}{x+4}$$

$$\frac{3x+4}{x^2+3x+2} = \frac{4}{x+4}$$

$$3x^2 + 12x + 4x + 16 = 4x^2 + 12x + 8$$

$$x^2 - 4x - 8 = 0$$

$$D = (-4)^2 - 4 \times 1 \times (-8) = 0$$

$$= 48$$

$$x = \frac{4 \pm \sqrt{48}}{2}$$

$$x = \frac{4 \pm 4\sqrt{3}}{2}$$

$$x = 2 \pm 2\sqrt{3}$$

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