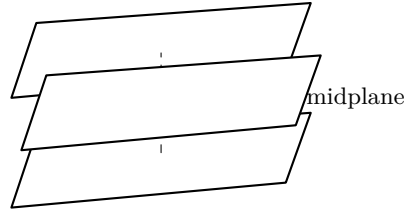


Question 8

Find the distance between the parallel planes $2x - y + 2z = 3$ and $4x - 2y + 4z = 21$. Find the plane exactly halfway between them.

Question 8 – Solution

Strategy Normalize the equations to identical left sides before comparing constants.



Distance Divide the second equation by 2 to get $2x - y + 2z = 21/2$. Therefore

$$d = \frac{|21/2 - 3|}{\sqrt{2^2 + (-1)^2 + 2^2}} = \frac{15/2}{3} = \boxed{5/2}.$$

Midplane Average the normalized constants: $(3 + 21/2)/2 = 27/4$. Hence

$$\boxed{2x - y + 2z = 27/4}.$$

Verification Its constant differs from each neighboring constant by $15/4$, corresponding to distance $5/4$.