

## PLANES - ANSWERS

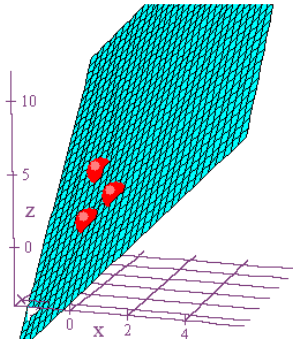
Use the given information to find the equation of the plane. For each problem, give your answer in the form  $z = Ax + By + C$ .

1. Contains the points  $P = (1, 0, 3)$  and  $Q = (0, 2, 4)$ , and intercepts the  $z$ -axis at  $(0, 0, 1)$ .

$$m_x = \frac{3-1}{1-0} = 2, m_y = \frac{4-1}{2-0} = \frac{3}{2}$$

$$z = 2x + \frac{3}{2}y + C \Rightarrow 1 = 2(0) + \frac{3}{2}(0) + C \Rightarrow C = 1$$

$$z = 2x + \frac{3}{2}y + 1$$

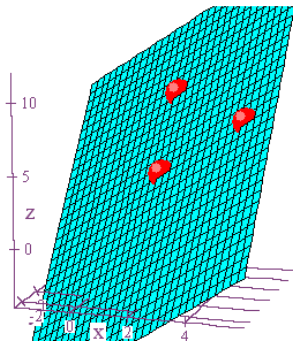


2. Contains the points  $P = (2, 3, 4)$ ,  $Q = (5, 3, 8)$ , and  $R = (2, 6, 9)$ .

$$m_x = \frac{8-4}{5-2} = \frac{4}{3}, m_y = \frac{9-4}{6-3} = \frac{5}{3}$$

$$z = \frac{4}{3}x + \frac{5}{3}y + C \Rightarrow 4 = \frac{4}{3}(2) + \frac{5}{3}(3) + C \Rightarrow C = -\frac{11}{3}$$

$$z = \frac{4}{3}x + \frac{5}{3}y - \frac{11}{3}$$

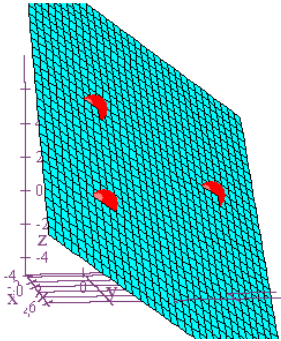


3. Has intercepts  $(0,0,5)$ ,  $(4,0,0)$ , and  $(0,10,0)$ .

$$m_x = \frac{5-0}{0-4} = -\frac{5}{4}, m_y = \frac{5-0}{0-10} = -\frac{1}{2}$$

$$z = -\frac{5}{4}x - \frac{1}{2}y + C \Rightarrow 5 = -\frac{5}{4}(0) - \frac{1}{2}(0) + C \Rightarrow C = 5$$

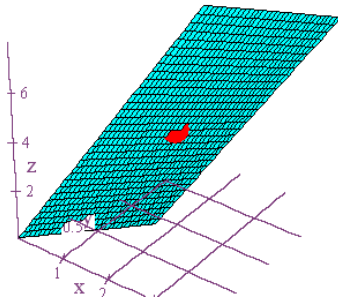
$$z = -\frac{5}{4}x - \frac{1}{2}y + 5$$



4. The slope in the direction of the positive  $x$ -axis is 3, the slope in the direction of the positive  $y$ -axis is -2, and it contains the point  $P = (2,1,4)$ .

$$z = 3x - 2y + C \Rightarrow 4 = 3(2) - 2(1) + C \Rightarrow C = 0$$

$$z = 3x - 2y$$



5. Contains the points  $P=(2,3,0)$ ,  $Q=(2,3,5)$ , and  $R=(2,3,9)$ .

No plane. The three points are collinear.

