PLANES - ANSWERS

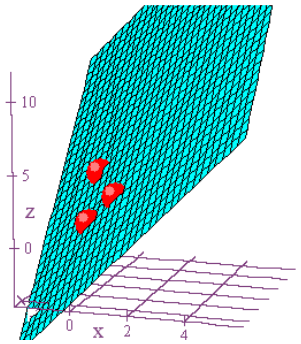
Use the given information to find the equation of the plane. For each problem, give your answer in the form $z = Ax + By + C$.

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

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

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

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

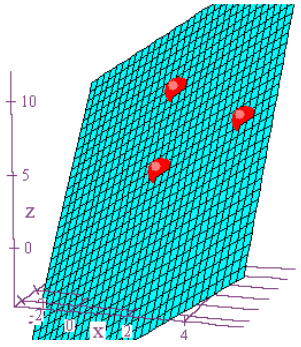


2. Contains the points $P = (2,3,4)$, $Q = (5,3,8)$, and $R = (2,6,9)$.

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

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

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

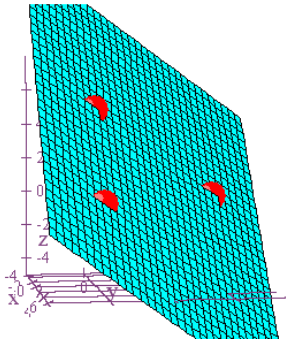


3. Has intercepts $(0,0,5)$, $(4,0,0)$, and $(0,10,0)$.

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

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

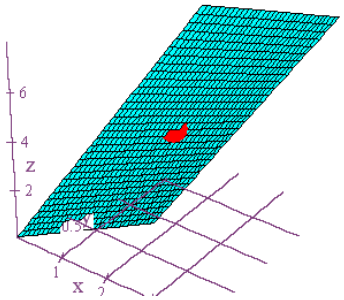
$$z = -\frac{5}{4}x - \frac{1}{2}y + 5$$



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 unique plane. The three points are collinear.