

## Answer on Question #64382 – Math – Linear Algebra

### Question

A vector  $A$  in  $OX_1X_2X_3$  has components  $(2, 1, -2)$ . Find its components in  $OX_1'X_2'X_3'$ . The transformation between the coordinates  $X_1, X_2, X_3$  and  $X_1', X_2', X_3'$  is defined by

$$X_1' = \frac{1}{3}(2x_1 + 2x_2 - x_3)$$

$$X_2' = \frac{1}{3}(2x_1 - x_2 + 2x_3)$$

$$X_3' = \frac{1}{3}(-x_1 + 2x_2 + 2x_3)$$

### Solution

Components of vector  $A$  in  $OX_1' X_2' X_3'$  are as follows:

$$X_1' = \frac{1}{3}(2*2 + 2*1 - (-2)) = \frac{1}{3}(4 + 2 + 2) = \frac{8}{3},$$

$$X_2' = \frac{1}{3}(2*2 - 1 + 2(-2)) = \frac{1}{3}(4 - 1 - 4) = -\frac{1}{3},$$

$$X_3' = \frac{1}{3}(-2 + 2*1 + 2(-2)) = \frac{1}{3}(-2 + 2 - 4) = -\frac{4}{3}.$$

**Answer:**  $\frac{8}{3}, -\frac{1}{3}, -\frac{4}{3}$ .