

Homework #93

Answers

From Houghton-Mifflin Precalculus

3rd Edition

p789:

37) $u = \langle 2, 3, 3 \rangle, v = \langle 4, 4, 0 \rangle, w = \langle 0, 0, 4 \rangle$

$$u \cdot (v \times w): \quad v \times w = \begin{vmatrix} i & j & k \\ 4 & 4 & 0 \\ 0 & 0 & 4 \end{vmatrix} = (16 - 0)i - (16 - 0)j + (0 - 0)k \\ = 16i - 16j = \langle 16, -16, 0 \rangle$$

$$u \cdot (v \times w) = (2)(16) + (3)(-16) + (3)(0) = -16$$

42) $u = i + j + 3k, v = 3j + 3k, w = 3i + 3k$

$$u \cdot (v \times w): \quad v \times w = \begin{vmatrix} i & j & k \\ 0 & 3 & 3 \\ 3 & 0 & 3 \end{vmatrix} = (9 - 0)i - (0 - 9)j + (0 - 9)k = 9i + 9j - 9k$$

$$\text{volume} = |u \cdot (v \times w)| = (1)(9) + (1)(9) + (3)(-9) = |-9| = 9$$

p798:

2b) $P = (3, -5, 1), v = \langle 3, -7, -10 \rangle \quad \frac{x-3}{3} = \frac{y+5}{-7} = \frac{z-1}{-10}$

7b) $(6, 0, 3), (2, 1, 8) \quad v = \langle 2 - 6, 1 - 0, 8 - 3 \rangle = \langle -4, 1, 5 \rangle$

$$\frac{x-6}{-4} = \frac{y}{1} = \frac{z-3}{5} \quad \text{or} \quad \frac{x-2}{-4} = \frac{y-1}{1} = \frac{z-8}{5}$$

(other answers are possible)

11) $P = (-4, -1, 7), v = 3i - j \quad \frac{x+4}{3} = \frac{y+1}{-1} = \frac{z-7}{0}$

$$\frac{x+4}{3} = \frac{y+1}{-1}$$

Test: a) $(-4, -1, 0): \frac{-4+4}{3} = \frac{-1+1}{-1}; 0=0 \quad \text{Yes}$

b) $(-1, -2, 7): \frac{-1+4}{3} = \frac{-2+1}{-1}; 1=1 \quad \text{Yes}$

c) $(-10, 1, 7): \frac{-10+4}{3} = \frac{1+1}{-1}; -2=-2 \quad \text{Yes}$

d) $(4, 1, -7): \frac{4+4}{3} = \frac{1+1}{-1}; 8/3 \neq -2 \quad \text{No}$

17) $P = (5, 6, 3), n = -2i + j - 2k \quad -2(x-5) + (y-6) - 2(z-3) = 0$

22) $(4, -1, 3), (2, 5, 1), (-1, 2, 1)$

$u = \langle 2 - 4, 5 - (-1), 1 - 3 \rangle = \langle -2, 6, -2 \rangle$

$v = \langle -1 - 4, 2 - (-1), 1 - 3 \rangle = \langle -5, 3, -2 \rangle$

$$n = u \times v = \begin{vmatrix} i & j & k \\ -2 & 6 & -2 \\ -5 & 3 & -2 \end{vmatrix} = (-12 - (-6))i - (4 - 10)j + (-6 - (-30))k = -6i + 6j + 24k$$

$$-6(x-4) + 6(y+1) + 24(z-3) = 0$$