

**HOMEWORK 12**  
**CALCULUS III**  
**DUE 02-27**

(1) Show that

$$\langle x_1, y_1, z_1 \rangle \times \langle x_2, y_2, z_2 \rangle = \begin{vmatrix} y_1 & z_1 \\ y_2 & z_2 \end{vmatrix} \vec{i} - \begin{vmatrix} x_1 & z_1 \\ x_2 & z_2 \end{vmatrix} \vec{j} + \begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \end{vmatrix} \vec{k}.$$

(2) Solve the system of equations

$$\begin{aligned} 2a + 3c &= 0 \\ -5a - b + 2c &= 0 \end{aligned}$$

from class to find all vectors  $\langle a, b, c \rangle$  that are orthogonal to both  $\langle 2, 0, 3 \rangle$  and  $\langle -5, -1, 2 \rangle$ .  
How is your answer related to the cross product  $\langle 2, 0, 3 \rangle \times \langle -5, -1, 2 \rangle$ ?

- **Nine** book problems: #11.4.2, 9, 10, 43, 44; #11.5.37, 48, 51, 53.