

LECTURE NOTES FOR FRIDAY MARCH 28TH

1. NORMAL TO PLANES

- The vector $\langle a, b, c \rangle$ is normal to the plane $ax+by+cz=d$. However, this tool requires us to know the equation of the plane.
- A second technique is to take any two vectors in the plane and find their cross product.

2. SCALAR TRIPLE PRODUCT

- The Scalar Triple Product of vectors $\mathbf{a}, \mathbf{b}, \mathbf{c}$ is $\mathbf{a} \cdot (\mathbf{b} \times \mathbf{c})$.
- The S.T.P represents the volume of the parallelepiped determined by the vectors in question.
- The S.T.P also represents the amount of effective force exerted by a pressure represented by \mathbf{a} on a surface represented by \mathbf{b} and \mathbf{c} .

3. GRADIENT

- The gradient is an operation that takes a function and gives a vector field.
- The gradient represents the direction of steepest ascent, and the size of that ascent.
- The gradient of a function f at p gives a vector orthogonal to the level surface $f(x, y, z) = f(p)$.
- The gradient is calculated as $\nabla f = \frac{\partial f}{\partial x} \mathbf{i} + \frac{\partial f}{\partial y} \mathbf{j} + \frac{\partial f}{\partial z} \mathbf{k}$