

1. [4 pts] Given the line L through $(1, 2, 3)$ parallel to the vector $\langle 1, 1, 1 \rangle$, and given a point $(2, 3, 5)$ which is not on L . Find a Cartesian equation for the plane M through $(2, 3, 5)$ which contains every point on L .

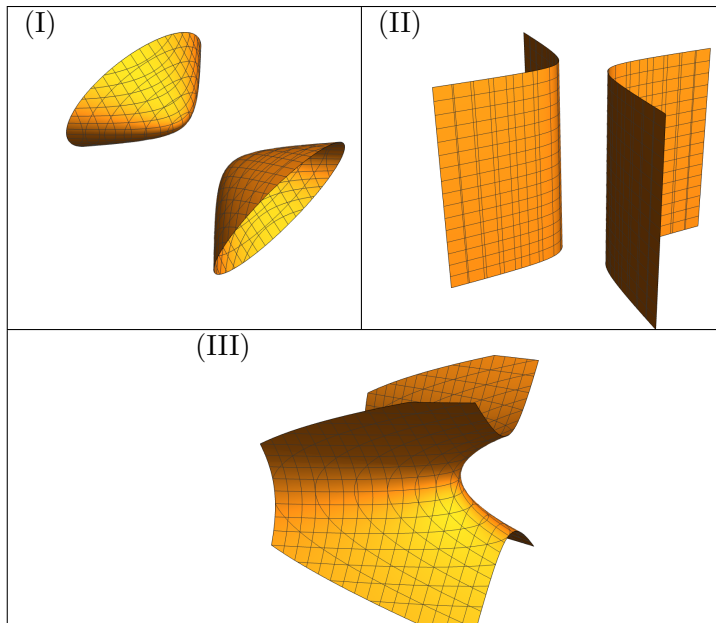
2. [3 pts] If the three vectors \mathbf{u} , \mathbf{v} , \mathbf{w} in \mathbb{R}^3 satisfy $\mathbf{u} \times \mathbf{v} \neq \mathbf{0}$ and $\mathbf{u} \times \mathbf{w} \neq \mathbf{0}$, but $(\mathbf{u} \times \mathbf{v}) \cdot (\mathbf{u} \times \mathbf{w}) = 0$, then it follows that
- (a) The plane spanned by \mathbf{u} and \mathbf{v} is orthogonal to the one spanned by \mathbf{u} and \mathbf{w} .
 - (b) $\mathbf{v} \perp \mathbf{w}$.
 - (c) $\mathbf{u} \perp \mathbf{v}$ and $\mathbf{u} \perp \mathbf{w}$.
 - (d) \mathbf{u} , \mathbf{v} and \mathbf{w} lie in the same plane.

3. [3 pts] Determine whether the parametrizations

$$\mathbf{r}_1(t) = \langle 3, -1, 4 \rangle + t\langle 8, 12, -6 \rangle \quad \text{and} \quad \mathbf{r}_2(t) = \langle 11, 11, -2 \rangle + t\langle 4, 6, -3 \rangle$$

describe the same line. If they do, show why. If they don't, show why not.

4. [4 pts] Match the contour surfaces with their equations. Enter O if there's no match.



$g(x, y, z) =$	$O, (I), (II), (III)$
$x^2 - y^2 + z^2 = 1$	
$x^2 - y^2 = 1$	
$x^4 + z = 1$	
$x^2 + y - z^2 = 1$	

5. [4 pts] The intersection of a plane with the cone $S = \{(x, y, z) : x^2 + y^2 - z^2 = 0\}$ is called a **conic section**. What curve do we get? In each row check only one box.

Intersect S with...	hyperbola(s)	parabola(s)	circle(s)	line(s)
$z = 1$ gives...				
$z = x$ gives...				
$z = x + 1$ gives...				
$x = 1$ gives...				