Vector a	**a = {∗ , ∗ , ∗}**
Vector norm	**Norm[a]**
Scalar product	**a.b**
Vector product	**Cross[a, b]**
Mixed product	**Det[{a, b, c}]**
Point A	**A = {∗ , ∗ , ∗}**

Parametric representation of line through two points *A*, *B*

p = A + (B − A) ∗ t

View of line

ParametricPlot3D[p, {t, ∗ , ∗5}, AxesLabel → {"x", "y", "z"}]

Parametric representation of plane through point *A*, with direction vectors **a**, **b**

ρ = A + a ∗ t + b ∗ s

View of plane

ParametricPlot3D[ρ, {t, ∗ , ∗}, {s, ∗ , ∗}, AxesLabel → {"x", "y", "z"}]

View of plane in the first octant

ContourPlot3D[equation, {x, 0, ∗}, {y, 0, ∗}, {z, 0, ∗}, AxesLabel → {"x", "y", "z"}]

View of a surface

ContourPlot3D[equation, {x, ∗, ∗}, {y, ∗, ∗}, {z, ∗, ∗}, AxesLabel → {"x", "y", "z"}]

Problems

1. Find norm of vector **a** = (2, 1, −3), scalar and vector (cross) product of vectors **a** and **b** = (3, −3, 1), and mixed product of vectors **a**, **b**, and **c** = (4, 2, −6).
2. Find equations and plot:
   a. line *p* passing through point *A* = [1, 4, 2] in direction **a** = (2, 1, −3),
   b. line with equations $3x + 6y + 4z = 9$, $x - y - z = 0$
   c. plane ρ determined by point *A* = [1, 4, 2] and line *r* with parametric equations $x = 1 + t$, $y = 4 + t$, $z = 0$.
3. Investigate mutual position of
   a. line *p* and plane ρ from problem 2
   b. planes α: $2x - 3y + 4z = 3$, β: $x - 2y - 3z = 1$, χ: $4x + 2y + z = 0$.
4. Plot surfaces with equations

   a. $x^2 + y^2 + z^2 = 1$
   b. $\frac{x^2}{3} + \frac{y^2}{9} + \frac{z^2}{16} = 1$
   c. $\frac{x^2}{3} + \frac{y^2}{9} - \frac{z^2}{16} = 1$
   d. $\frac{x^2}{2} + \frac{y^2}{9} - \frac{z^2}{2} = -1$
   e. $-x^2 + y^2 + z^2 = -1$.
   f. $\frac{x^2}{3} - \frac{y^2}{9} + \frac{z^2}{16} = 0$
   g. $\frac{x^2}{3} + \frac{y^2}{9} = -z$
   h. $\frac{x^2}{2} - \frac{y^2}{3} = z$
   i. $x^2 + z^2 = 4$
   j. $x^2 - y^2 = 1$
   k. $y^2 + 2z = 0$
   l. $(z - 2)^2 = 2(x - 1)$