

University of Delaware
Department of Mathematical Sciences

MATH-243 – Analytical Geometry and Calculus C
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Fall 2012

Homework 3

Due date: September 24, 2012

Problems

Taken or adapted from Section 12.5–12.6 the book *Calculus: Early Transcendentals* 7th edition by J. Stewart.

1. Find a vector equation for the line through $(1, 2, 10)$ and parallel to the line $\langle 1 - 3t, t, -1 - 3t \rangle$.
2. Find a vector equation for the line through $(-1, 1, 1)$ and perpendicular to the plane $4x - y - z = 3$.
3. Using projections, find the distance between the point $(1, 0, -1)$ and the plane $x + y + z = 1$.
4. Using projections, determine the distance between the lines $\langle 3 + 2t, 4 - t, 1 + 3t \rangle$ and $\langle 1 + 4s, 3 - 2s, 4 + 5s \rangle$.
5. Find an equation of a plane that passes through the line of intersection of the planes $x - z = 1$ and $y + 2z = 3$ and is perpendicular to the plane $x + y - 2z = 1$.
6. Determine whether the points $(1, 3, 2)$, $(3, -1, 6)$, $(5, 2, 0)$ and $(3, 6, -4)$ lie in the same plane. If so, what is the equation of that plane?

You need to study Section 12.6 in order to solve the following.

Reduce the equation to one of the standard forms, classify the surface and sketch it.

7. $x^2 = 2y^2 + 3z^2$
8. $4x - y^2 + 4z^2 = 0$
9. $4y^2 + z^2 - x - 16y - 4z + 20 = 0$
10. $x^2 - y^2 + z^2 - 2x + 2y + 4z + 2$