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 18, 2012

Problems

Taken or adapted from Sections 12.1–12.5 the book *Calculus: Early Transcendentals* 7th edition by J. Stewart.

1. Find a vector equation for the line through $(1, 4, -1)$ and $(0, 2, 2)$.
2. Find a vector equation for the line through $(1, 2, 0)$ and parallel to the line $\langle 1 - 2t, 3 + t, -1 - 3t\rangle$.
3. Find a vector equation for the line through $(0, 1, 1)$ and perpendicular to the plane $x + 2y - z = 3$.
4. Find the distance between the point $(1, 0, -1)$ and the line $< -1 + 2t, 2 - t, 1 + 3t >$.
5. Find the linear equation of the plane through $(3, -1, 2)$, $(8, 2, 4)$ and $(3, 2, 1)$.
6. Use the scalar triple product to determine whether the vectors $\langle 1, 5, -2\rangle$, $\langle 3, 01, 0\rangle$ and $\langle 5, 9, -4\rangle$ are coplanar.
7. Determine whether the points $(1, 3, 2)$, $(3, -1, 6)$, $(5, 2, 0)$ and $(3, 6, -4)$ lie in the same plane.
8. Find the values of x such that the vectors $\langle 3, 2, x\rangle$ and $\langle 2x, 4, x\rangle$ are orthogonal.
9. Suppose $\vec{u} \cdot (\vec{v} \times \vec{w}) = 2$. Find a) $(\vec{u} \times \vec{v}) \cdot \vec{w}$, b) $\vec{u} \cdot (\vec{w} \times \vec{v})$, c) $\vec{v} \cdot (\vec{u} \times \vec{w})$, and d) $(\vec{u} \times \vec{v}) \cdot \vec{v}$.
10. If $\vec{r} = \langle x, y\rangle$, $\vec{r}_1 = \langle x_1, y_1\rangle$, and $\vec{r}_2 = \langle x_2, y_2\rangle$, describe the set of all points (x, y) such that $||\vec{r} - \vec{r}_1|| + ||\vec{r} - \vec{r}_2|| = k$, where $k > ||\vec{r}_1 - \vec{r}_2||$.