## Homework Set 5, Math 424

## Due: March 26, 2015

(1) Let $L: \mathbb{R}^{3} \rightarrow \mathbb{R}^{2}$ be a linear transformation. Let $N$ be a unit vector in $\mathbb{R}^{3}$ such that $N \perp L\left(\mathbb{R}^{3}\right)$. Let $e_{1}, e_{2}, e_{3}$ be an orthonormal basis of $\mathbb{R}^{3}$ and $e_{1}, e_{2} \in L\left(\mathbb{R}^{3}\right)$. Define

$$
X=\left(\operatorname{det}\left(N, L e_{2}, L e_{3}\right),-\operatorname{det}\left(N, L e_{1}, L e_{3}\right), \operatorname{det}\left(N, L e_{1}, L e_{2}\right)\right) .
$$

Prove

$$
\left.\operatorname{det}\left(X, e_{1}, e_{2}\right)=\operatorname{det}\left(N, L e_{1}, L e_{2}\right)\right)
$$

(2) Exercise 8.15, 8.16, 8.17, 8.19

