

## Math 213 Halloween/Thanksgiving Question, Dr. Cleary

The Great Pumpkin just got back to the North Pole after delivering presents to all the good little boys and girls of the world in celebration of Halloween. After collapsing on his comfy chair with a well-deserved mug of hot chocolate, he realizes with horror that he forgot to visit two good kids. He forgot a boomerang for Lisa who lives in Quito, Ecuador, and a basketball for Maggie who lives in Douala, Cameroon. The Great Pumpkin needs to drop off presents at their houses quickly. But, since the Great Pumpkin thought that he was done, he has unfortunately already laid off six of the Great Eggplants who pull his sled through the sky. With only four Great Eggplants left to pull the sled, he is worried about how his sled will do in headwinds. He checks The Weather Channel (you'd have cable, too, if you lived at the north pole!) and according to the Vectro-Meterological Specialist there, the vector field describing the winds on the surface of the earth is given by:

$$\vec{F} = (z + 1)\hat{i} + z\hat{j} + (y - x)\hat{k}.$$

He lives at the north pole (0,0,4) and both Lisa and Maggie live on the equator at (4,0,0) and (0,4,0) respectively.

Now that his sled is underpowered, it is very important for him to make sure that he won't have to do much work against the wind so as not to exhaust his depleted Great Eggplants pulling the sled. Help him to decide which way to go. Should he visit Maggie first, then Lisa, then head home or should he go to Lisa's first, then Maggie's, then home? Which way will there be less work against the wind?