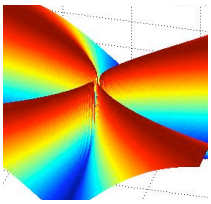
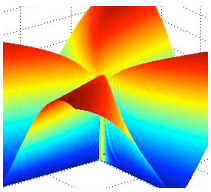


M254H HW 4

Due Monday Feb. 10



From Adams and Essex

Chapter	Page Number	Problems
11.5	655-656	4, 7, 14, 22
12.1	676	17, 23
12.2	680-681	6, 7, 12, 13, 16, 20
		Use an $\epsilon - \delta$ argument to establish existence of the limit, you may show non-existence by looking at path limits.

Non-book Exercises

1) Revisit the bead on the wire from class, but with friction. Specifically, a bead of mass m slides on a wire parameterized by

$$\vec{r} = (x, x^2 - 2x, x^3 - 3x), \qquad x \in \mathbb{R}.$$

Gravity exerts a force $-mg\vec{k}$, and the bead has charge q and is subject to a magnetic field $\vec{D} = (0, 0, 1)$. The wire exerts a frictional force $-\alpha\vec{v}$ on the bead where $\vec{v}$ is the kinematic velocity of the bead and α equals the magnitude of the force exerted by the wire on the bead in the Normal and Binormal directions. Physically – the force the wire exerts on the bead in the Normal and Binormal directions acts like a 'rubbing' friction which slows the bead down. If the kinematic speed of the bead at $\vec{P} = (1, -1, -2)$ is v, determine the Tangential component of the kinematic acceleration when the bead is at position $\vec{P}$ in terms of the data : m, v, q, and g.