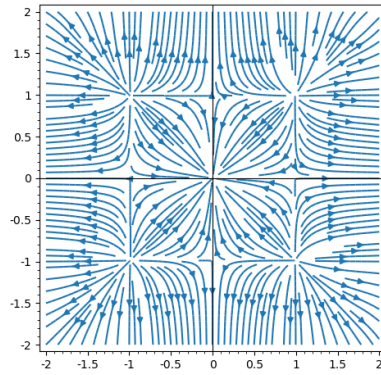
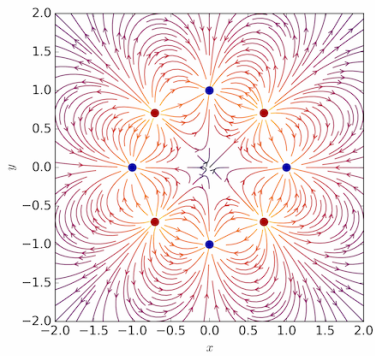
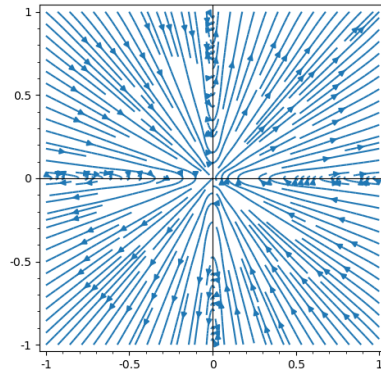
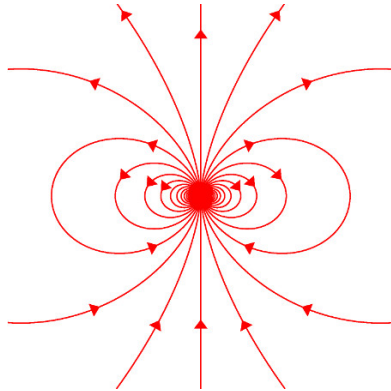


Math 322 lecture for Friday, Week 10

Problem 1. Compute the indices for all the critical points pictured below.



In the remaining problems, all vector fields should be smooth and with isolated singularities.

Problem 2. Draw three vector fields on a sphere: one containing a sink, one containing a center, and one containing a saddle. In addition to the prescribed critical points, your vector field may contain other critical points. Calculate the indices for all critical points. What is the sum of the indices in each of the three instances?

Problem 3. Draw four vector fields on a torus, calculating the indices for all critical points. What is the sum of the indices in each instance?

Problem 4. Draw a vector field on a two-holed donut, calculating the indices for all critical points. What is the sum of the indices?

Problem 5. Draw a vector field on an n -holed torus. Calculate the indices of the critical points, and find the sum of the indices.

Problem 6. Suppose each of the vector fields in Problem 1 was draped over a sphere with the origin at the north pole. Complete the vector field to one on the whole sphere, adding only one more critical point—at the south pole. What would the critical point at the south pole look like? What would its index be? Is the type of critical point unique?