

Names:

Group Number; _____

Problem 1: For each of the above distance functions, sketch a circle of radius one centered at the origin (i.e., plot the set of points A such that the distance from A to $(0, 0)$ is equal to 1.).

- Problem 2:** Suppose d_1 is used to find the distance between points in \mathbf{R}^2 and $l = \{(x,y) : y - 3x = 0\}$.
- Find a coordinate system f for l . Given your coordinate system f , which point has coordinate 10?
 - Find a coordinate system g for l such that $g(3,9) = 0$.

Problem 3: The same as the preceding problem, only using d_∞ as the means of determining the distance between points.

Problem 4: Let f be a coordinate system for a line l and define $g : l \rightarrow \mathbf{R}$ by $g(A) = -f(A)$ for each $A \in l$. Prove that g is a coordinate system for l .

Problem 5: Prove the *Ruler Placement Theorem*: Let l be a line and A and B two points on l . Then l has a coordinate system in which the coordinate of A is 0 and the coordinate of B is positive.