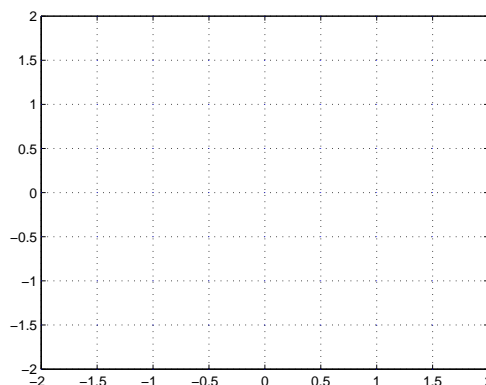
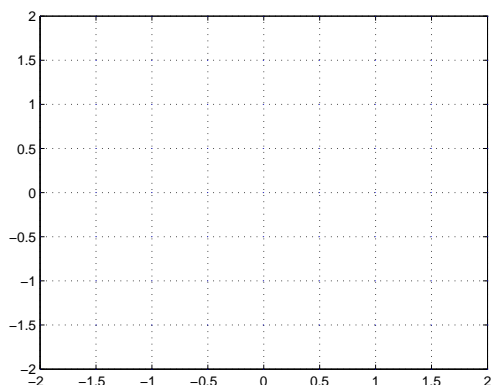


This quiz is to be taken in groups, of three people or less. Each group member is responsible to submit their own solutions.

A turducken walks the path $r(t) = \langle t \cos(\pi t), t \sin(\pi t) \rangle$ for $t = [0, 2]$. During the walk, it resists a force whose potential function is $\phi = x^2 + y^2$, so that $F = \nabla\phi$.



1. On the first graph, draw the level sets of the potential function $\phi = x^2 + y^2$, corresponding to $\phi = 0, 1$ and $\phi = 4$, and a representation of the gradient vector field $F = \nabla\phi$, with sample vectors at $(0, 0), (\pm 1, \pm 1), (0, \pm 1), (\pm 1, 0)$.
2. On the second graph, draw the path the turducken walks.
3. John Madden promises not to eat the turducken if it did enough work, $W = \int_C \mathbf{F} \cdot d\mathbf{s}$. Madden's criteria is if $W < 5$, the turducken is lunch. Does the turducken survive? If you finish early, feel free to draw a turducken on the back.