

**Math 675 Spring 2026:
Homework 1 Unit ?
Due Tuesday, January 3rd, 2026**

Question 1:

For each system of differential equations in a-d below

- Plot the change vector using the points $(1, 1), (1, -1), (-1, -1), (-1, 1)$
 - Use the vector field to classify the equilibrium point(s) as stable, unstable, a saddle point, an unstable spiral, a stable spiral, or a center.
- | | |
|--|---|
| <p>(a) $x' = -x, \quad y' = -5y$
Coupled: No;
Equilibrium Points: $(0, 0)$</p> | <p>(c) $x'_1 = x_2, \quad x'_2 = -2x_1 - 3x_2$
Coupled: Yes;
Equilibrium Points: $(0, 0)$</p> |
| <p>(b) $x' = 4x - y, \quad y' = 2x + y$
Coupled: Yes;
Equilibrium Points: $(0, 0)$</p> | <p>(d) $x' = 5x + 2y, \quad y' = -17x - 5y$
Coupled: Yes;
Equilibrium Points: $(0, 0)$</p> |

Question 2:

Question 3: