

**SEVENTH HOMEWORK, DUE THURSDAY OCTOBER
28TH**

Feel free to work with others, but the final write-up should be entirely your own and based on your own understanding.

1. (10 pts) Let $\vec{F}: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be the vector field defined by $\vec{F}(x, y) = x\hat{i} + y\hat{j}$.

(a) Show that \vec{F} is a gradient flow.

(b) Find the flow line that passes through $(a, b) \neq (0, 0)$ at time $t = 0$.

2. (10 pts) (3.3.2)

3. (10 pts) (3.3.21)

4. (10 pts) (3.3.24)

5. (10 pts) (4.1.8)

6. (10 pts) (4.1.14)

7. (10 pts) (4.1.18)

8. (10 pts) (4.1.20)

9. (10 pts) (4.1.33)

10. (10 pts) (4.1.34)

Just for fun: What are the Taylor polynomials of the function

$$f(x) = e^{-1/x^2},$$

at the origin? What does this say about the remainder?