1. (10 pts) Compute $\int_{\mathcal{C}} y^2 ds$ where $\mathcal{C}$ is the curve $y = e^x, 0 \leq x \leq 1$.

2. (10 pts) Compute $\oint_{\mathcal{C}} x^2 dx + y^2 dy$ where $\mathcal{C}$ is the unit circle oriented counter-clockwise.

Bonus. (5 pts) Compute $\oint_{\mathcal{C}} y^2 dx + x^2 dy$ where $\mathcal{C}$ is as in Problem 2.

1. (10 pts) Compute $\int_C y\,ds$ where C is the curve $y = x^3, 0 \leq x \leq 1$.

2. Suppose a wire C is the quarter of the unit circle in the first quadrant, and is of constant density 1. (1) (10 pts) Find the center of mass of the wire. (2) (5 pts, bonus) what if the density is y^2?