

Math 2551 Worksheet Section 16.1

1. Find the line integral of $f(x, y) := \sqrt{x^2 + y^2}$ over the curve $\vec{r}(t) = (-4\sin t)\hat{i} + (4\cos t)\hat{j} + 3t\hat{k}$, $t \in [0, 2\pi]$.
2. Find the line integral of $f(x, y) = \sqrt{4x + 1}$ over C where C is the part of the curve $x = y^2$ from the point $(4, -2)$ to $(1, 1)$.
3. Let C be the curve with parametrization

$$\vec{r}(t) = (e^t \cos t)\hat{i} + (e^t \sin t)\hat{j} + e^t\hat{k}, t \in [0, \pi].$$

Find the mass of C if the density of a wire along C is $\delta(x, y, z) = z^{-1}$.

4. Find the center of mass and the moments of inertia about the y -axis of a thin wire lying along the curve

$$\vec{r}(t) = t\hat{i} + \frac{2\sqrt{2}}{3}t^{3/2}\hat{j} + \frac{t^2}{2}\hat{k}, \quad 0 \leq t \leq 2,$$

if the density $\delta(t) = \frac{1}{t+1}$.