21   11-11-2025 - Midterm 3 tomorrow

21.1   Section 6.2, Checkpoint 6.14

Evaluate $\int_C (x^2 + y^2 + z)\, ds$, where C is the curve parameterized by $r(t) = \langle \sin(3t), \cos(3t), t \rangle$ for $0 \leq t \leq 2\pi$

21.2   Section 6.2, Checkpoint 6.15

Evaluate $\int_C (x^2 + yz)\, ds$, where C is the line with parameterization $r(t) = \langle 2t, 5t, -t \rangle$ for $0 \leq t \leq 10$.

Now reparameterize C as $s(t) = \langle 4t, 10t, -2t \rangle$ for $0 \leq t \leq 5$, and recalculate the line integral.

You should see that scalar line integrals are independent of parameterization.

21.3   Section 6.2, Checkpoint 6.19

Now we are working on vector line integrals. Calculate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$, where $\mathbf{F}(x, y) = \langle y^2, 2xy+1 \rangle$ and C is a triangle with vertices $(0, 0), (4, 0), (0, 5)$, oriented counterclockwise.

Things to remember for MT3:
- transforms for change of variables
- center of mass, moment of inertia, etc.
- bounds in Cartesian, cylindrical, spherical
- line integrals, diff between scalar and vector and their different properties
- remember parameterizations from the first part of the course