Written HW15 – MATH 3503 Fall 2021

Due by 13 October for timely completion credit

Recall that the scalar line integral of f over the curve C, parametrized by $\vec{r}(t)$ with parameter bounds $a \leq t \leq b$ is computed by the "magic formula"

$$\int_C f \, \mathrm{d}s = \int_a^b f(\vec{r}(t)) \, \|\vec{r}'(t)\| \, \mathrm{d}t.$$

Below you will calculate some of these integrals by parametrizing the described curve C and integrating the result using the magic formula.

1. C is the line segment from $(-1, 0)$ to $(3, 7)$ and $f(x, y) = x^2 + y^2$
2. C is the portion of the circle $x^2 + y^2 = 3$ (where $x \leq 0$) and $f(x, y) = x^2 y + x y^2$
3. C is the triangle formed by the three points $(-2, 0)$, $(0, 1)$, and $(3, 0)$ (oriented counterclockwise!) and $f(x, y) = y - 3x^2$