Written HW11 – MATH 3503 Fall 2020

Due by 11 November for timely completion credit

Find a function f such that $\nabla f = \vec{F}$ and use it to apply the fundamental theorem of line integrals to evaluate $\displaystyle\int_C \vec{F} \cdot \mathrm{d}\vec{r}$. Recall that the fundmental theorem of line integrals says that if C is a curve that goes from starting point $\vec{r}(a)$ to ending point $\vec{r}(b)$, then

$$\int \nabla f \cdot \mathrm{d}\vec{r} = f(\vec{r}(b)) - f(\vec{r}(a)).$$

1. $\vec{F} = \langle y, x+2y \rangle$ and C is the upper semicircle that starts at $(0,1)$ and ends at $(2,1)$
2. $\vec{F} = \langle x^3y^4, x^4y^3 \rangle$ and C is given by $\vec{r}(t) = \langle \sqrt{t}, 1+t^3 \rangle$ for $0 \leq t \leq 1$