Math 13 Worksheet #10: Vector fields and work

(1) Draw the vector field $\boldsymbol{F}(x, y) =< y, x - y >$.

(2) Is the vector field $\boldsymbol{F}(x, y) =< 2xy, x^2 + 1 >$ conservative? If so, find the corresponding potential function f.

(3) Find the gradient vector field of $f(x, y, z) = x \ln(y - 2z)$.

(4) Evaluate $\int_C \boldsymbol{F} \cdot d\boldsymbol{r}$ where $\boldsymbol{F}(x, y, z) =< x,\ y,\ xy >$, $\boldsymbol{r}(t) =< \cos t,\ \sin t,\ t >$, and $0 \leq t \leq \pi$.