

**Quiz 12;** Wednesday, April 20  
**MATH 53** with Professor Stankova  
**Section 116;** 3-4  
**GSI:** Eric Hallman

**Student name:**

You have 10 minutes to complete the quiz. Calculators are not permitted, and remember to show your calculations and explain your reasoning in order to receive full credit.

1. If  $\mathbf{F}(x, y) = \langle -1, -1 \rangle$ , find the work that the force field  $\mathbf{F}$  does on a goat running **counterclockwise** from  $(1, 0)$  to  $(-1, 0)$  along the unit circle.

Set  $x(t) = \cos t, y(t) = \sin t$  as  $t$  goes from 0 to  $\pi$ . Then

$$\begin{aligned}\int_C \mathbf{F} \cdot d\mathbf{r} &= \int_{t=0}^{\pi} \langle -1, -1 \rangle \langle -\sin t, \cos t \rangle dt \\ &= \int_{t=0}^{\pi} \sin t - \cos t dt \\ &= [-\cos t - \sin t]_0^{\pi} \\ &= 2.\end{aligned}$$