Quiz 12; Wednesday, April 20
MATH 53 with Professor Stankova
Section 109: 11-12
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 $F(x, y) = (y, -x)$, find the work that the force field $F$ does on a goat running once clockwise around the unit circle.

   Set $x(t) = \cos t$, $y(t) = -\sin t$ (note the negative sign) Then

   $$\int_C F \cdot dr = \int_{t=0}^{2\pi} (y, -x) \cdot r'(t) \, dt$$
   $$= \int_{t=0}^{2\pi} (-\sin t, -\cos t) \cdot (-\sin t, -\cos t) \, dt$$
   $$= \int_{t=0}^{2\pi} \sin^2 t + \cos^2 t \, dt$$
   $$= \int_{t=0}^{2\pi} 1 \, dt$$
   $$= 2\pi.$$