WRITE YOUR NAME:

MAC 2313 Quiz 21
Tuesday April 9th

Evaluate the line integral

$$\int_C (3x + 2y)\, ds$$

where C is the straight line segment from $(0, 0)$ to $(4, 3)$.

Parametrize C: $\vec{r}(t) = (x, y) = (4t, 3t)$ where $0 \le t \le 1$

$ds = |\vec{r}\,'(t)|\,dt = |(4, 3)|\,dt = \sqrt{4^2 + 3^2}\,dt = 5\,dt$

$$\int_C (3x + 2y)\, ds = \int_{t=0}^{t=1} (3 \cdot \underbrace{4t}_{x} + 2 \cdot \underbrace{3t}_{y}) \cdot \underbrace{5\,dt}_{ds}$$

$$= \int_{t=0}^{t=1} (12t + 6t) \cdot 5\,dt = 5 \int_{t=0}^{t=1} 18t\,dt$$

$$= 5 \left[9t^2 \right]_{t=0}^{t=1} = 5 \cdot 9 = 45$$