

Quiz 2 Calculus 3 11/8/19

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Let $\mathbf{F}(x,y) = \langle 4x, xy \rangle$. Compute $\int_C \mathbf{F} \cdot d\mathbf{r}$ for C the top half of a circle with radius 3 centered at the origin, traversed counterclockwise.

I. $\vec{r}(t) = \langle 3\cos t, 3\sin t \rangle \quad 0 \leq t \leq \pi$

II. $\vec{F}(\vec{r}(t)) = \langle 12\cos t, 9\cos t \sin t \rangle$

III. $\vec{r}'(t) = \langle -3\sin t, 3\cos t \rangle$

IV. $\int_0^\pi \langle 12\cos t, 9\cos t \sin t \rangle \cdot \langle -3\sin t, 3\cos t \rangle dt$

V. $\int_0^\pi -36\cos t \sin t + 27\cos^2 t \sin t dt$

$= \int_0^\pi -36\cos t \sin t dt + \int_0^\pi 27\cos^2 t \sin t dt$

U-sub

$U = \sin t$

$du = \cos t$

$\int -36u du + \int -27u^2 du$

U-sub

$U = \cos t$

$-du = \sin t$

$= [-18U^2] + [-9U^3] = [-18\sin^2 t]_0^\pi + [-9\cos^3 t]_0^\pi$

$= 0 + (9 - (-9)) = 0 + 9 + 9 = 18$

Great