Quiz 2- Calculus 3 11/7/16

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

1. Let $\mathbf{F}(x,y) = \langle 5x^4y, x^5 \rangle$, and C be the line segment from (–2,1) to (2,3). Compute $\int_C \mathbf{F} \cdot d\mathbf{r}$.

$f(x,y) = x^5y$ ← potential function

$f_x = 5x^4y$

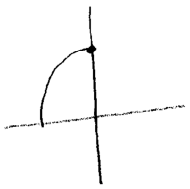
$f_y = x^5$

Fundamental Theorem.

$\int_c F\,dr = f(2,3) - f(-2,1) = 2^5 \cdot 3 - (-2)^5 \cdot 1 = 128$

Great

2. Let $\mathbf{F}(x,y) = \langle x^2, xy \rangle$. Compute $\int_C \mathbf{F} \cdot d\mathbf{r}$ for C the second-quadrant portion of a circle with radius 3 centered at the origin, traversed counterclockwise.



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

for $\frac{\pi}{2} \le t \le \pi$

II $F(\vec{r}(t)) = \langle (3\cos t)^2,\ (3\sin t \cdot 3\cos t) \rangle$

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

IV $\int_{\pi/2}^{\pi} \langle 9\cos^2 t,\ 9\sin t\cos t \rangle \cdot \langle -3\sin t,\ 3\cos t \rangle$

V $= \int_{\pi/2}^{\pi} -27\cos^2 t \sin t + 27\cos^2 t \sin t$

$= \int_{\pi/2}^{\pi} 0$

Excellent!

$= 0$