NAME: Solutions

SECTION: ____

Math 2401 (D1-D3)
11/03/2014

Quiz 8
Only one more quiz to go!!!

(5pts) 1. Compute the line integral:

$$\int_C f\,ds,$$

where $f(x,y) = ye^{x^2}$ and C is the curve in the plane given by $\vec{r}(t) = \langle t, -2t\rangle$, $-2 \le t \le -1$.

on C: $x = t$, $y = -2t$

$f(\vec{r}(t)) = -2te^{t^2}$ (1 pt.)

$\vec{r}\,'(t) = \langle 1, -2\rangle$ (1 pt.)

$|\vec{r}\,'(t)| = \sqrt{1+4} = \sqrt{5}$ (1 pt.)

$$\int_C f\,ds = \int_{-2}^{-1} (-2te^{t^2})\sqrt{5}\,dt$$ (1 pt.)

$$= -\sqrt{5}e^{t^2}\Big|_{-2}^{-1}$$ (1 pt.)

$$= -\sqrt{5}\left(e - e^4\right)$$

$$= \boxed{\sqrt{5}(e^4 - e)}$$

(5pts.) 2. Compute the line integral:

$$\int_C f\,ds,$$

where

$$f(x,y,z) = \frac{x+y+z}{x^2+y^2+z^2},$$

and C is the curve in space given by $\vec{r}(t) = \langle 2t, t, 3t\rangle$, $0 < a \le t \le b$.

on C: $x = 2t$, $y = t$, $z = 3t$

$f(\vec{r}(t)) = \dfrac{2t+t+3t}{4t^2+t^2+9t^2} = \dfrac{6t}{14t^2} = \dfrac{3}{7t}$ (1 pt.)

$\vec{r}\,'(t) = \langle 2, 1, 3\rangle$ (1 pt.)

$|\vec{r}\,'(t)| = \sqrt{14}$ (1 pt.)

$$\int_C f\,ds = \int_a^b \frac{3}{7}\frac{1}{t}\sqrt{14}\,dt$$ (1 pt.)

$$= \frac{3\sqrt{14}}{7}\ln(t)\Big|_a^b$$ (1 pt.)

$$= \boxed{\frac{3\sqrt{14}}{7}\left[\ln(b) - \ln(a)\right]}$$

$$= \boxed{\frac{3\sqrt{14}}{7}\ln(b/a)}$$