Review Quiz
Math 2350
Fall 2007

Name and section Solution

1. (25%) Consider the curve C given by the vector valued function

$$\mathbf{R}(t) = \langle t, t^2 \rangle = t\mathbf{i} + t^2\mathbf{j},\ t \geq 0.$$

Find the unit tangent vector $\mathbf{T}(t)$ for C.

2. (25%) Revrite the integral

$$\int_0^1 \int_0^{2x} f(x,y)\, dy\, dx$$

with the order of integration reversed.

3. (25%) Rewrite the function

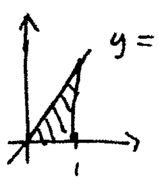
$$f(x,y,z) = x + ze^{x^2+y^2}$$

in cylindrical coordinates.

4. (25%) Compute curl of the vector field

$$\mathbf{F}(x,y,z) = \langle y^2+z, x^2+z, x^2+y \rangle = (y^2+z)\mathbf{i} + (x^2+z)\mathbf{j} + (x^2+y)\mathbf{k}.$$

① $\bar{R}'(t) = \langle 1, 2t \rangle$, $\|\bar{R}'(t)\| = \sqrt{1+4t^2}$, $\bar{T}(t) = \frac{1}{\sqrt{1+4t^2}} \langle 1, 2t \rangle$

② 

$y = 2x \iff x = \frac{1}{2}y$

$$\int_0^1 \int_0^{2x} f(x,y)\,dy\,dx = \int_0^2 \int_{\frac{1}{2}y}^1 f(x,y)\,dx\,dy$$

③ $f(r,\theta,z) = r\cos\theta + ze^{r^2}$

④ $\text{curl } \bar{F} = \nabla \times \bar{F} = \begin{vmatrix} \bar{i} & \vec{j} & \bar{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ y^2+z & x^2+z & x^2+y \end{vmatrix}$

$= (1-1)\vec{i} - (2x-1)\vec{j} + (2x-2y)\bar{k} = \langle 0, 1-2x, 2x-2y \rangle$