Fall 2020	ENG 5300	Quiz 2	Yichun Li
You must show all work to receive full credit. All work is to be your own.			
This is a closed bo	ooks and notes test. Be org	ganized. Total poin	ts: 20 19:44-19:51
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- 1. Verify the following identities for f,  $\mathbf{F}$  and  $\nabla = \left[\frac{\partial}{\partial x}, \frac{\partial}{\partial y}, \frac{\partial}{\partial z}\right]$ 
  - (a) Let w = f(x, y, z) be a continuous function with continuous second partial derivatives. Verify that 5points

$$\nabla\times\nabla f=\mathbf{0}$$

(b) Let  $F_1(x, y, z)$ ,  $F_2(x, y, z)$ ,  $F_3(x, y, z)$  be continuous functions with continuous second partial derivatives. Let  $\mathbf{F} = [F_1, F_2, F_3]$ . Verify that 5points

$$abla \cdot 
abla imes \mathbf{F} = \mathbf{0}$$

2. §10.4 Evaluation of Line Integrals by Green's Theorem. Using Green's Theorem, evaluate  $\oint_C \mathbf{F}(\mathbf{r}) \cdot d\mathbf{r}$ counterclockwise around the boundary curve C of the region R, where  $\mathbf{F} = \text{grad} (x^3 \cos^2(xy)), R: 1 \le y \le 2 - x^2$  10 points