Math 2471 Calc 3 - Homework #10

Pg. 1076, #3, and 7.
Pg. 1085, #5 and 7.

Pg. 1076 For the following show (a) the vector field is conservative and (b) verify that $\int_C \vec{F} \cdot d\vec{r}$ is the same for each parametric curve C

#3 $\vec{F}(x,y) = x^2\vec{i} + y\vec{j}$

(i) $C_1 : \vec{r}_1(t) = t\vec{i} + t^2\vec{j}, \quad 0 \le t \le 1$

(ii) $C_2 : \vec{r}_2(t) = \sin\theta\vec{i} + \sin^2\theta\vec{j}, \quad 0 \le \theta \le \pi/2$

#7 $\vec{F}(x,y,z) = y^2z\vec{i} + 2xyz\vec{j} + xy^2\vec{k}$

(i) $C_1 : \vec{r}_1(t) = t\vec{i} + 2t\vec{j} + 4t\vec{k}, \quad 0 \le t \le 1$

(ii) $C_2 : \vec{r}_2(t) = \sin\theta\vec{i} + 2\sin\theta\vec{j} + 4\sin\theta\vec{k}, \quad 0 \le \theta \le \pi/2$

Pg. 1085 Verify Greens theorem by evaluating both integrals in

$$\int_C y^2dx + x^2dy = \iint_R \left(Q_x - P_y\right) dA \tag{1}$$

5. C boundary of the region lying between the graphs $y = x$ and $y = x^2$
7. C square with vertices $(0,0)$, $(1,0)$, $(1,1)$ and $(0,1)$

Due: Tuesday, July 26, 2022.