Math 3214: Homework 9 (Due Wednesday 4/16, 5pm)

To obtain (full) credit, show all reasoning and work.

No calculator or other electronic devices for HWs.

Problems 1-9 require an appropriate sketch that includes the orientation of each surface and boundary curve

1. Section 8.1: 9.
2. Section 8.1: 11a You need to compute the line integral with and without integral theorem.
3. Compute $\int_C (2y + x^3)\ \mathrm{d}x + x^2\ \mathrm{d}y$ where C is the boundary of the square $[0,1] \times [0,1]$ in the clockwise direction.
4. Compute $\int_C \boldsymbol{F} \cdot\ \mathrm{d}\boldsymbol{s}$ where $\boldsymbol{F}(x,y) = (xy,\ \sqrt{y}\mathrm{e}^y)$ and C is the triangular curve with vertices $(0,0)$, $(2,0)$, and $(1,1)$ oriented in the counterclockwise direction.
5. Section 8.2: 3. You need to compute the surface integral and line integral.
6. Section 8.2: 13. S is oriented according to the normal pointing out of S.
7. Review exercises for Ch. 8 (p. 490): 1 (Only for the top and bottom included).
8. Compute $\int_C \boldsymbol{F} \cdot\ \mathrm{d}\boldsymbol{s}$ where C is the curve of intersection of $x^2 + y^2 = 1$ and $z = x$, with counterclockwise orientation when viewed from above. The vector field $\boldsymbol{F}(x,y,z) = (\mathrm{e}^x \sin x,\ y^2,\ y+z)$.
9. Compute $\iint_S (\boldsymbol{\nabla} \times \boldsymbol{F}) \cdot\ \mathrm{d}\boldsymbol{S}$ where S is the surface $x^2 + y^2 + 4z^2 = 4$ with $z \leq 0$ and oriented according to the downward pointing normal. The vector field $\boldsymbol{F}(x,y,z) = (y,\ -x,\ zx^2y^3)$.
10. Review exercises (p. 491): 21ab.