CALCULUS 1260

TAKE HOME TEST 7 Due Friday 11/18/2016

Your Name (PRINT IN BLOCK LETTERS):

INSTRUCTIONS

Work all problems. SHOW YOUR WORK. Circle your answers. Each problem is worth 10 points max.

YOU CAN GET HELP ON CONCEPTS, BUT YOUR WORK MUST BE INDEPENDENT.

1. Let $C$ be the boundary of the rectangle with sides $x = 1, y = 2, x = 3, y = 3$, positively oriented. Compute $\int_C (xy^2 - y^3)dx + (-5x^2 + y^3)dy$

   (a) directly
   (b) using Green’s Theorem
2. Let $C$ be the (positively oriented) boundary of the region $D$ described by $1/4 \leq x^2 + y^2 \leq 1$. and let $\mathbf{F} = \langle \frac{y}{x^2+y^2}, \frac{-x}{x^2+y^2} \rangle$. Use Green’s Theorem to evaluate $\int_C \mathbf{F} \, d\mathbf{r}$. 
3. Find the mass of the triangle with vertices \((a, 0, 0), (0, a, 0)\) and \((0, 0, a)\) if its density function is \(\rho(x, y, z) = y^2\).
4. Use Stokes’ Theorem to evaluate $\int_C \mathbf{F} \, d\mathbf{r}$ where

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

and $C$ is the boundary of the triangle with vertices $(1, 0, 0)$, $(0, 1, 0)$ and $(0, 0, 1)$.