Worksheet #24; date: 04/17/2018
MATH 53 Multivariable Calculus

1. *(Concept check)* What is a positively oriented curve?

2. *(Stewart 16.4.3; modified)* Evaluate the line integral directly first, then using Green's Theorem.

$$\int_C xy\,dx + x^2y^3\,dy,$$

where C is the triangle with vertices $(0,0)$, $(1,2)$, $(1,0)$.

3. *(Stewart 16.4.17)* Use Green's Theorem to find the work done by the force $\mathbf{F}(x,y) = x(x+y)\mathbf{i} + xy^2\mathbf{j}$ in moving a particle from the origin along the x-axis to $(1,0)$, then along the line segment to $(0,1)$ and then back to the origin along the y-axis.

4. *(Stewart 16.4.22)* Let D be a region bounded by a simple closed path C in the xy-plane. Use Green's Theorem to prove that the coordinates of the centroid $(\bar{x}, \bar{y})$ of D are

$$\bar{x} = \frac{1}{2A}\oint_C x^2\,dy, \qquad \bar{y} = -\frac{1}{2A}\oint_C y^2\,dx$$

where A is the area of D.

5. Turn in your homework, it's quiz time!

6. *(Stewart 16.4.27; modified)* Use the method of Example 5 to calculate $\int_C \mathbf{F}\cdot d\mathbf{r}$, where

$$\mathbf{F}(x,y) = \frac{(x^2-y^2)\mathbf{i} + 2xy\mathbf{j}}{(x^2+y^2)^2}$$

and C is any positive oriented simple closed curve that encloses the origin.