Math 403:01 **Homework assignment #3** **February 15, 2010**

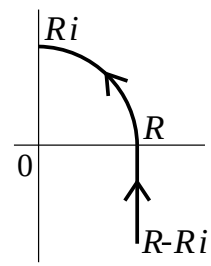
Correction In problem A, the phrase "$-iR$ to R" has been changed to "$R-iR$ to R" which is what I meant and what the accompanying diagram now indicates more definitely. I thank Mr. Marcus for this correction (2/17).

Due at the beginning of class, Wednesday, February 24, 2010

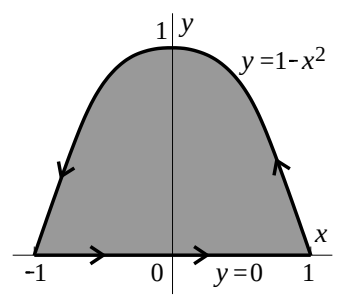
Solve these textbook problems (4 points each):

1.6 (page 73): 1, 4 (see page 60), 7 (there's an answer in the back of the book but please try to get a different verification using Green's Theorem).

2.2 (page 103): 2, 9, 10. (This section has problems about power series. We have *not* covered most of the material in it yet. Problem 2 asks for the radius of convergence. This follows directly from things done in class. For problems 9 and 10, get the requested series using series which are already known and simple "tricks" first used in calc 2.)



A. (10 points) Suppose R is a large positive real number, and Q_R is the line segment S_R from $R-iR$ to R followed by the quarter circular arc C_R from R to iR as shown. If $I_R = \displaystyle\int_{Q_R} \frac{e^{-z}}{z^2-4z+15}\,dz$, find an <u>estimate</u> for $|I_R|$ and use the estimate to verify that $\lim\limits_{R\to\infty} I_R = 0$.



B. (10 points) Verify Green's Theorem for the region R in the plane whose boundary C is the parabolic arc $y = 1-x^2$ (for $-1 \le x \le 1$) and the line segment $y = 0$. Assume that the boundary has the correct orientation, and that $P(x,y)$ and $Q(x,y)$ have continuous partial derivatives on the boundary curves and at all points of the interior open set. Use the 1 variable Fundamental Theorem of Calculus to prove $\int_C P(x,y)\,dx + Q(x,y)\,dy = \iint_R \frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\,dx\,dy$.