Math 185 Quiz 2

Don't forget to write down clearly your **Name**: and **ID number:**

1. True or False (10 points). Mark "T" (True) in front of a correct statement and "F" (False) in front of a wrong one.

____ The complex function $f(z) = z^3 + 2\overline{z}$ is complex analytic on all $\mathbb{C}$.

____ If $f(z)$, $g(z)$ are complex analytic on a domain D, so is their product $f(z)g(z)$.

____ The function $f(z) = e^z$ has its real part a two-variable harmonic function.

____ The function $f(z) = z^3$ is conformal at $z = 0$.

____ A harmonic function $u(x, y)$ on any domain D has a harmonic conjugate $v(x, y)$.

2. Harmonic functions (5 points). Prove that $u(x, y) = x/(x^2 + y^2)$ is harmonic.

3. Integration of one-forms (5 points). Integrate the 1-form along the positively oriented unit circle in your favorite way:

$$\oint_{\partial D} x^2 dy,$$

where $D = \{(x, y) | x^2 + y^2 \leq 1\}$.