Complex Analysis Homework #3
Due Friday, February 13

(1) Find the values of the given expressions. Be sure to show all work.
   (a) $\log(1 + i\sqrt{3})$
   (b) $(1 + i)$
   (c) $(4 - 4i)$
   (d) $i^{\sqrt{3}}$
   (e) $\log((1 - i)^4)$
   (These are # 3, 5, 9, 11, 13 from section 1.5)

(2) Prove that $\cos^2 z + \sin^2 z = 1$ for all $z \in \mathbb{C}$.

(3) Parametrize the following curves.
   (a) The upper half of the unit circle in $\mathbb{R}^2$.
   (b) The line segment from $(2, 0)$ to $(-1, 3)$.

(4) Calculate the following line integrals.
   (a) $\int_C x^2 + y^2 dx$ where C is the line from $(1, 2)$ to $(4, 5)$.
   (b) $\int_C x^2 + y^2 dy$ where C is the upper half of the unit cirle.
   (c) $\int_C y\,dx + x\,dy$ where C is the parabola parametrized by $\gamma(t) = (t, t^2)$ from $t = 0$ to $t = 1$.