Exercises due 10/16

(1) Compute
$$\int_{|z|=2} \frac{dz}{z^2 - 1}$$
going positively (counterclockwise) around the circle.

(2) Compute
$$\int_{|z|=1} |z - 1|\,|dz|$$

(3) Suppose $f(z)$ is analytic in a region Ω (so that $f'(z)$ is continuous). Show that for any closed curve γ in Ω
$$\int_\gamma f(z)\overline{f'(z)}\,dz$$
is purely imaginary.

(4) Prove Cauchy's theorem for a triangle.