1. Evaluate
\[ \int_C \frac{y}{z} \, dz, \]
where \( C \) is the contour consisting of the upper half of the unit circle from \( = 1 \) to \(-1\). (In the integrand, \( y = \text{Im} \, z \).)

2. With the same contour \( C \) as in part 1, evaluate
\[ \int_C \frac{3z^2}{z^3 + 2} \, dz. \]
Clarify which theorem(s) you use and why they apply.

3. Suppose \( C \) is the positively oriented ellipse with equation \( 4x^2 + y^2 = 4 \). Evaluate
\[ \int_C \cot z \, dz. \]
Clarify which theorem(s) you use and why they apply. (Hint: show that \( \cot z \cdot z \) is analytic inside \( C \). How this observation can be used?)