1. Evaluate the integral

$$\int_C \frac{2z^3}{(z-1)(z^2+8)}\,dz$$

Taken counterclockwise around the circle $C = \{z : |z - 2| = 2\}$.

2. Find the linear fractional transformation sending $z_1 = i, z_2 = 0, z_3 = 1$ to the points $w_1 = -i, w_2 = i, w_3 = 1$.

3. State and prove the Cauchy's integral formula.