1. Express the following symmetric polynomials \( f(x, y, z) \) in \( x, y, z \) as polynomials \( g(e_1, e_2, e_3) \) in the elementary symmetric polynomials:

\[
e_1 = x + y + z, \ e_2 = xy + xz + yz, \ e_3 = xyz
\]

(a) \( x^2yz + xy^2z + xyz^2 \)
(b) \( x^3y^2 + x^3z^2 + x^2y^3 + y^3z^2 + x^2z^3 + y^2z^3 \)
(c) \( x^4 + y^4 + z^4 \)

2. Find all 12 elements of the alternating group \( A_4 \) and write out their 12 x 12 multiplication matrix. What are all the subgroups of \( A_4 \)?