Suppose that is a finite group and is a normal subgroup of.

1. Explain briefly how the quotient group is defined. [You should explain what the elements of are, how the multiplication is defined, what the identity element is and how inverses are defined. You do *not* need to prove that the multiplication is well-defined.]

Show that the map

is a homomorphism. What is the kernel of?

1. Hence show that if is a representation of the quotient group then the map defined by

(for each) is a representation of.

1. Now let, the alternating group of even permutations of. Let

Show that. To which well-known group is the quotient group isomorphic?

1. For and as in (iii) above, write down (without proof) three degree one representations of.
2. Hence describe three degree 1 (and hence irreducible) representations of. Write down the characters of the representations you have found on representatives of the four conjugacy classes of.