Math 4800/6080. Week Ten Starter

1. Let r_1, r_2 be the two roots (maybe complex) of the polynomial:
$$ax^2 + bx + c$$
   (a) Find expressions for b and c in terms of the two roots and a.

   (b) Express the discriminant:
$$b^2 - 4ac$$
in terms of the two roots.

2. Let r_1, r_2, r_3 be the three roots (maybe complex) of the polynomial:
$$ax^3 + bx^2 + cx + d$$
   Find expressions for b, c, d in terms of the three roots.

3. Generalize 1(a) and 2 to polynomials of any degree.

4. Use Sylvester's determinant to expression the discriminants of:
   (a) $x^3 + px + q$
   (b) $x^3 + rx^2 + s$
   (c) $x^4 + px + q$
   (d) $x^4 + rx^2 + s$
   (e) $x^4 + tx^3 + u$