Higher Exercise 2

1. The functions f and g are defined on suitable domains by $f(x) = 3x - 5$ and $g(x) = x^2$.

   a. Find a simplified expression for f(g(x)).
   b. Find a simplified expression for g(f(x)).

2. A sequence is defined by the recurrence relation $U_{n+1} = cU_n + d$.

   a. Find the values of c and d if $U_1 = 10$, $U_2 = 7$ and $U_3 = 4$.
   b. Hence, find the values of U_0 and U_4.

3. The functions f and g are defined on suitable domains by $f(x) = 6x - 3$ and $g(x) = 2 - 4x$.

   a. Find a simplified expression for f(g(x)).
   b. Find a simplified expression for g(f(x)).
   c. Hence solve the equation $f(g(x)) - g(f(x)) = 6x + 8$.

4. The vertices of the triangle PQR are P(2, 6), Q(-4, -4) and R(-3, 7).

   a. Find the equation of the median from R.
   b. Find the equation of the altitude from Q.
   c. The median from R and altitude from Q intersect at point T. Find the coordinates of the point of intersection.