1) (a) Given two functions \( f \) and \( g \). What is meant by the composite function \( f \circ g \).
   (b) What is meant by (i) a one-to-one function \( f \).
       (ii) the inverse of a one-to-one function \( f \)
   (c) How are the graphs of \( f \) and \( f^{-1} \) related?
   (d) What is the division algorithm?

2) (a) Let \( f(x) = \frac{1}{x} \)
       Find \( f \circ f \) and its domain.
   (b) Find the domain and inverse of \( f(x) = \frac{4x-2}{3x+1} \).
   (c) (i) Sketch the graph of \( f(x) = \sqrt{x-1} \). What are the domain
       and range of \( f \)?
       (ii) Use the graph of \( f \) to sketch the graph of \( f^{-1} \). What are the domain
       and range of \( f^{-1} \)?
       (iii) Find the equation for \( f^{-1} \).

3) (a) Suppose that \( g(x) = 2x + 1 \) and \( h(x) = 4x^2 + 4x + 7 \).
       Find a function \( f \) such that \( f \circ g = h \).
       Hint: Think about what operations you will have to perform on the formula for \( g \) to end up the formula for \( h \).
       Now suppose that \( f(x) = 3x + 5 \) and \( h(x) = 3x^2 + 3x + 2 \).
       Use similar reasoning to find \( g \) such that \( f \circ g = h \).

   (Please try if time permits):
   (b) Let \( P(x) = 3x^4 - x^3 - 2x^2 + 4x - 1 \) and \( D(x) = x + 2 \).
       Find polynomials \( Q(x) \) and \( R(x) \) such that
       \( P(x) = D(x)Q(x) + R(x) \).