Selected exercises chapter 3 of Pure Mathematics 1 by Hugh Neil and Douglas Qualing.

1. Find the largest possible domain of each of the following functions:
   a) \( \frac{1}{1 + \sqrt{x}} \)
   b) \( \frac{1}{(x - 1)(x - 2)} \)

2. The domain of these functions is the set of all positive real numbers. Find their ranges:
   a) \( f(x) = -5x \)
   b) \( f(x) = 3x - 1 \)
   c) \( f(x) = (x - 1)^2 + 2 \)

3. For what values of \( x \) are these inequalities satisfied?
   a) \( x^{-4} \geq 100 \)
   b) \( 8x^{-4} < 0.00005 \)

4. Given that \( k \) is a positive constant, sketch the graphs of:
   a) \( y = (x + 4k)(x + 2k) \)
   b) \( y = (x - k)(x - 5k) \)

5. Show that the curves \( y = 2x^2 + 5x, \ y = x^2 + 4x + 12 \) and \( y = 3x^2 + 4x - 6 \) have one point in common and find its coordinates.

6. Given that the curves \( y = x^2 - 3x + c \) and \( y = k - x - x^2 \) meet at the point \((-2, 12)\), find the values of \( c \) and \( k \). Hence find the other point where the two curves meet.

7. The straight line \( y = x - 1 \) meets the curve \( y = x^2 - 5x - 8 \) at the points A and B. The curve \( y = p + qx - 2x^2 \) also passes through the points A and B. Find the values of \( p \) and \( q \).

8. The line \( y = 10x - 9 \) meets the curve \( y = x^2 \). Find the coordinates of the points of intersection.