Question 1: For the function

$$f(x) = \frac{x^2 - 1}{x^2 - 4}$$

(a)[3 points] State the domain.

(b)[2 points] Find the y-intercept of the graph of f.

(c)[2 points] Find the x-intercepts of the graph of f.

(d)[3 points] Determine if f is even.

Question 2:

(a)[5 points] Find the point of intersection of the lines

$$2x - y + 13 = 0$$
$$x + 2y - 1 = 0$$

(b)[5 points] Find the equation of the line through $(-3, 1)$ which is perpendicular to the line $x + 2y - 2 = 0$.

Question 3: For the quadratic function

$$f(x) = -x^2 + 6x - 5$$

(a)[3 points] Put the function in standard form.

(b)[3 points] State the vertex and axis of symmetry.

(c)[4 points] Sketch the graph of f. Label the vertex, and indicate the scale on the x and y axes.

Question 4:

(a)[4 points] Find and simplify $(f \circ g)(x)$ where $f(x) = \dfrac{x+2}{x}$ and $g(x) = \dfrac{2}{x}$.

(b)[3 points] State the domain of $f \circ g$ from part (a).

(c)[3 points] Suppose $F(x) = \dfrac{\sqrt{x^2+1}+2}{x^2}$. Find functions f and g such that $F = f \circ g$. (There are many possible answers here).

Question 5:

(a)[5 points] The function $f(x) = \dfrac{4x}{x+1}$ has domain $(-\infty, -1) \cup (-1, \infty)$ and range $(-\infty, 4) \cup (4, \infty)$. Find f^{-1} and state its domain and range.

(b)[5 points] Below is the graph $y = f(x)$ for some function f. Sketch the graph of $y = f^{-1}(x)$ on the same coordinate axes. Your graph must be accurate to receive full marks.