Problem 1. Compute the limit

$$\lim_{x\to\infty} \left(\frac{6x^2 + 2}{3x + 7} - \frac{4x + 5}{2} \right).$$

Problem 2. For this problem, we will consider the function

$$f(x) = \frac{e^x - 1}{e^x + 1}.$$

(1) What is the domain of f?

(2) Is f even, odd, or neither?

(3) Compute $\lim_{x\to-\infty} f(x)$.

(4) Compute $\lim_{x\to\infty} f(x)$. Be careful with limit laws.

(5) Sketch the graph of $y = f(x)$, keeping in mind your answers to the above questions.

Problem 3. For this problem, we will consider the function

$$g(x) = \frac{7x^2 + 5}{x^2 - 4x + 3} + \frac{\sqrt{x^2 - 4}}{4x + 1}.$$

(1) What is the domain of g?

(2) Find all vertical asymptote(s) of g. Additionally, for each vertical asymptote $x = a$, determine $\lim_{x\to a^-} g(x)$ and $\lim_{x\to a^+} g(x)$.

(3) Compute $\lim_{x\to-\infty} g(x)$.

(4) Compute $\lim_{x\to\infty} g(x)$.

(5) Sketch the graph of $y = g(x)$, keeping in mind your answers to the above questions.