MATH 231.FA22 Practice Makeup Test 1

Solve the following exercises concisely explaining all solution steps. Answers without presentation of justification of solution steps are not awarded credit. (35 minutes, 1.5 course points per multiple choice question, 4 course points per free-form question)

1. The function

$$f(x) = \sqrt{\frac{x-1}{x-3}}$$

   a) has a defined limit as $x \to 1$.

   b) has a defined limit as $x \to 1^+$.

   c) has a defined limit as $x \to 1^-$.

   d) does not have a limit.

2. How many asymptotes (horizontal, vertical and slant) does the function

$$f(x) = \frac{2x^2 + 6}{2x^2 + 3x - 2}$$

   have?

   a) None

   b) 4

   c) 2

   d) 1

3. Determine the limit

$$L = \lim_{x \to 3} \frac{\sqrt{3x + 16} - 5}{x - 3}$$

4. Determine the limits at $\pm\infty$ of the function

$$f(x) = \frac{e^{-x} + 7x^e}{2e^{-x} + 4x^{2e}}.$$

5. Evaluate and simplify y' for

$$y(x) = 5t^2 e^{-t} \sin t.$$