Quiz 02 – Solutions

Math 140-002: Calculus I (Spring 2026)
Week 2 (Jan 19–Jan 23, 2026)

Relevant topics: Limits (one-sided/two-sided), continuity, vertical asymptotes, epsilon–delta idea

1. **Problem.** Evaluate $\lim_{x\to 1} \frac{x^2-1}{x-1}$.

   Solution. 2.

2. **Problem.** Find $\lim_{x\to 0^+} \ln x$.

   Solution. $-\infty$.

3. **Problem.** State the epsilon–delta definition of $\lim_{x\to a} f(x) = L$.

   Solution. Formal definition.

4. **Problem.** Identify the hole and vertical asymptote of $f(x) = \frac{x-3}{x^2-5x+6}$.

   Solution. Factoring the denominator, we find that

   $$f(x) = \frac{x-3}{(x-3)(x-2)}.$$

   Therefore, $\lim_{x\to 3} f(x) = 1$ and $\lim_{x\to 2} f(x) = \pm\infty$. So, $x = 3$ is a hole and $x = 2$ is a vertical asymptote.