PRACTICE QUIZ 5 SOLUTIONS

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Time: 10 min
Time to beat: 4 min

Problem 1. Find the limit $\lim_{x\to -1} \frac{x^2+3x+2}{x^2+4x+3}$

$$\lim_{x\to -1} \frac{(x+2)(x+1)}{(x+3)(x+1)} = \lim_{x\to -1} \frac{x+2}{x+3} = \frac{1}{2}$$

Problem 2. Find the limit $\lim_{x\to 2} \frac{x-2}{\sqrt{x^2-4}}$.

$$\lim_{x\to 2} \frac{(x-2)\sqrt{x^2-4}}{x^2-4} = \lim_{x\to 2} \frac{(x-2)\sqrt{x^2-4}}{(x-2)(x+2)} = \lim_{x\to 2} \frac{\sqrt{x^2-4}}{x+2} = 0$$

Problem 3. Find the limit $\lim_{x\to 2} \frac{\sqrt{x-2}}{x^2-4}$.

$$\lim_{x\to 2} \frac{x-2}{(x-2)(x+2)\sqrt{x-2}} = \lim_{x\to 2} \frac{1}{(x+2)\sqrt{x-2}}$$

and it is impossible to get rid of the zero in the denominator at this point, so the limit does not exist. We could also say it equals infinity.

Problem 4. Evaluate $\lim_{x\to +\infty} \frac{7x^9-4x^5+2x-13}{-3x^9+x^8-5x^2+2x}$ (Hint: you do not need to factor anything).

We look at the leading terms (the terms with the highest exponent in the numerator and denominator), so our limit is the same as

$$\lim_{x\to +\infty} \frac{7x^9}{-3x^9} = -\frac{7}{3}$$