larks

Short-Answer Questions. Questions 1 and 2 are short-answer questions. Put your answer in the box provided. Full marks will be given for a correct answer placed in the box. Show your work also, for part marks. Each part is worth 3 marks, but not all parts are of equal difficulty. **Simplify your answers as much as possible in Questions 1 and 2.**

[9] 1. Determine whether each of the following limits exists, and find the value if they do. If a limit below does not exist, determine whether it "equals" ∞, $-\infty$, or neither.

(a) [3] $\lim_{x\to -1} \dfrac{x^2-x-2}{x^2-1}$

$\lim_{x\to -1} \dfrac{(-1)^2-(-1)-2}{(-1)^2-1}$

$\lim_{x\to -1} \dfrac{1+1-2}{0} = \dfrac{0}{0}$

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

$x^2-x-2 = (x+1)(x+2)$

$x^2-1 = (x-1)(x+1)$

Answer: $3/2$

(b) [3] $\lim_{t\to 1} \dfrac{\sqrt{t^2+8}-3}{t-1}$

$\lim_{t\to 1} \dfrac{\sqrt{t^2+8}-3}{t-1}$

$\lim_{t\to 1} = \dfrac{\sqrt{1+8}-3}{0} = \dfrac{\#}{0}$

Answer: DNE

(c) [3] $\lim_{x\to 0^-} \left(\dfrac{1}{x} - \dfrac{1}{|x|}\right)$

Let $x = -0.0001$

$\Rightarrow \lim_{x\to 0^-} \left(\dfrac{1}{x} - \dfrac{1}{|x|}\right)$

$= \lim \dfrac{1}{-0.0001} - \dfrac{1}{|-0.0001|} = \dfrac{2}{-0.0001}$ ← really small, so get close

Answer: $-\infty$

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