

Quiz 5
Nov. 1, 2006

1. (10 pts) Determine the value of a that makes the given function continuous (on $(-\infty, \infty)$).

$$f(x) = \begin{cases} ae^x + 1 & \text{if } x < 0 \\ x^2 + x - 1 & \text{if } x \geq 0 \end{cases}$$

Ans: $a + 1 = -1 \Rightarrow a = -2$

2. (10 pts) Determine the following limits (answer as appropriate, with a number, $-\infty$, ∞ or does not exist).

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$$\lim_{x \rightarrow 2} \frac{x^2}{4 - x^2}$$

$$\lim_{x \rightarrow 2^-} \frac{x^2}{4 - x^2} = +\infty \quad (0 < x < 2; 4 - x^2 > 0)$$

$$\lim_{x \rightarrow 2^+} \frac{x^2}{4 - x^2} = -\infty \quad (x > 2; 4 - x^2 < 0)$$

$$\lim_{x \rightarrow 2} \frac{x^2}{4 - x^2} \quad DNE$$

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$$\lim_{x \rightarrow \infty} \frac{x^2}{4 - x^2} = \lim_{x \rightarrow \infty} \frac{1}{4/x^2 - 1} = -1$$