Name: GST

Math 1A Worksheet

1. Say $\lim_{x\to 4} f(x) = 1$ and $\lim_{x\to 7} g(x) = 2$. What is

$$\lim_{x\to 0} \frac{f(2x+4)}{g(7-x)}?$$ ½

2. What is

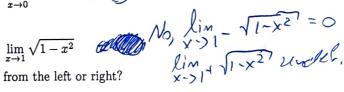$$\lim_{h\to 0} = \frac{(x+h)^2 - x^2}{h}?$$ $\lim_{h\to 0} \frac{2x(h) + h^2}{h} = \lim_{h\to 0} 2x + h = 2x$

3. What is

$$\lim_{x\to 0} \frac{x - x^3/3! + x^5/5! - x^7/7!}{x}?$$ $= \lim_{x\to 0} 1 - \frac{x^2}{6} + \frac{x^4}{120} - \cdots = 1$

4. What is

$$\lim_{x\to 0} e^{-1/x^2}?$$ $= 0$

5. Does

$$\lim_{x\to 1} \sqrt{1 - x^2}$$

exist? Why or why not? What about the limits from the left or right?   No, $\lim_{x\to 1^-} \sqrt{1-x^2} = 0$ $\lim_{x\to 1^+} \sqrt{1-x^2}$ undef.

6. What is

$$\lim_{x\to\infty} \frac{3x^2 + 2x + 1}{x^2 - 2}?$$ 3

7. Say $f(x_1, x_2)$ is a function which takes as input *two* values, and outputs one value. Is it possible that

$$\lim_{x_2\to\infty} \left(\lim_{x_1\to\infty} f(x_1, x_2) \right) \neq \lim_{x_1\to\infty} \left(\lim_{x_2\to\infty} f(x_1, x_2) \right)$$ Yes. $f(x_1, x_2) = \frac{x_1}{x_2}$

8. What is

$$\lim_{x\to 0} \sin(1/x)?$$ DNE

What about

$$\lim_{x\to 0} x\sin(1/x)?$$ 0