Recitation #6 - 2.6 Continuity

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Warm up: Explain why the Intermediate Value Theorem does not guarantee a zero for $f(x) = \dfrac{x-1}{x^2-5x}$ on the interval $(2, 6)$, even though $f(2) < 0$ and $f(6) > 0$.

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Group work:

Problem 1 *Find the intervals where the following function is continuous. Write your answer as a list of intervals in interval notation, separated by commas.*

$$f(x) = \begin{cases} 5x+7 & \text{if } x < -3 \\ \dfrac{(x-1)(x+2)}{x+2} & \text{if } -3 \le x < 1 \text{ and } x \neq -2 \\ 4\ln x & \text{if } x \ge 1 \end{cases}$$

Problem 2 *Find a and b so that $f(x)$ is continuous for all values of x.*

$$f(x) = \begin{cases} ax^2 + 38 & \text{if } x < 3 \\ a+b & \text{if } x = 3 \\ 2bx - a & \text{if } x > 3 \end{cases}$$

Problem 3 *Use the Intermediate Value Theorem to find an interval in which you can guarantee that there is a solution to the equation $x^3 = x + \sin x + 1$. Do not use any sort of graphing device to solve this problem.*