CALCULUS

MINI EXAM 1
SECOND SECTION

NAME: _____

ID: _____

SCORE: _____/ 80

RULES:

- You have 30 minutes to complete the exam.
- There are 3 questions and 80 points in total.
- You can use a non-graphing calculator.
- If you need to go to the restroom, please turn in your cellphone before.

Date: September 9, 2024.

Problem 1 (30 points). How many kinds of discontinuity of a function $f(x)$ at a point a? For each kind of discontinuity, give an example.

Problem 2 (30 points). Do the limits below exist? Give reason.

(1) $\lim\limits_{x\to 1} \dfrac{x^2-4}{x-1}$

(2) $\lim\limits_{x\to 2} f(x)$ where $2x-1 \leqslant f(x) \leqslant x^2-2x+3$.

Problem 3 (20 points). Consider

$$f(x) = \begin{cases} (x+k)^3\,, & x < 0 \\ 2 + \sin x\,, & x \geqslant 0\,. \end{cases}$$

Find k to make $f(x)$ continuous at $x = 0$.