

\* Answer and mark clearly the questions in the provided answer sheets.  
 Write down your name and student's ID on the each answer sheet you used.  
 \* **Note:** No points will be given if no arguments are provided for an answer.  
*Good Luck!*                                  *~~ Yuling* ☺

1. (10 points) Find the domain and range of the function

$$f(x) = \frac{x}{\sqrt{x-9}}$$

2. (10 points) Determine whether the function  $f(x) = x^4$  is one-to-one. If it is, find its inverse function.
3. (10 points) Find the inverse function of  $f$ , where  $f(x) = \sqrt{x^2 - 4}$ ,  $x \geq 2$ .
4. (50 points) Find the indicated limit or show it does not exist. If the limiting value is infinite, indicate whether it is  $\infty$  or  $-\infty$ .

$$(a) \lim_{x \rightarrow -1} \frac{2x^2 - x - 3}{x + 1}, \quad (b) \lim_{\Delta t \rightarrow 0} \frac{(t + \Delta t)^2 - 4(t + \Delta t) + 2 - (t^2 - 4t + 2)}{\Delta t},$$

$$(c) \lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{x - 3}, \quad (d) \lim_{x \rightarrow 0} \frac{\sqrt{x+2} - \sqrt{2}}{x}, \quad (e) \lim_{x \rightarrow 0^-} \frac{x+1}{x}$$

5. (10 points) Discuss the continuity of the function

$$f(x) = \frac{x-1}{x^2 - 4x + 3}$$

on the closed interval  $[0, 4]$ . If there are any discontinuities, determine whether they are removable.

6. (10 points) Find the constants  $a$  and  $b$  such that the function  $f(x)$  is continuous on the entire real number line, where

$$f(x) = \begin{cases} 2 & x \leq -1 \\ ax + b & -1 < x < 3 \\ -2 & x \geq 3 \end{cases}$$