⋆ 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! $\sim\sim$ *Yuling* $\ddot{\smile}$

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 $f(x) = \sqrt{x^2-4}, \quad x \geq 2$.

4. (50 points) Find the indicated limit or show it does not exist. If the limiting value is infinite, indicate whether it is ∞ or $-\infty$.
$$(a)\ \lim_{x\to -1} \frac{2x^2-x-3}{x+1}, \quad (b)\ \lim_{\Delta t\to 0} \frac{(t+\Delta t)^2-4(t+\Delta t)+2-(t^2-4t+2)}{\Delta t},$$
$$(c)\ \lim_{x\to 3} \frac{\sqrt{x+1}-2}{x-3}, \quad (d)\ \lim_{x\to 0} \frac{\sqrt{x+2}-\sqrt{2}}{x}, \quad (e)\ \lim_{x\to 0^-} \frac{x+1}{x}$$

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