

★ 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

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

2. (10 points) Determine whether the function  $f(x) = |x+3|$  is one-to-one. If it is, find its inverse function.  
3. (10 points) Find the inverse function of  $f$ , where  $f(x) = \sqrt{9-x^2}$ ,  $0 \leq x \leq 3$ .  
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  $-\infty$ .

$$(a) \lim_{x \rightarrow -3} \frac{x^2-9}{x+3}, \quad (b) \lim_{\Delta t \rightarrow 0} \frac{(t+\Delta t)^2 - 5(t+\Delta t) - (t^2-5t)}{\Delta t},$$

$$(c) \lim_{x \rightarrow 4} \frac{\sqrt{x+5}-3}{x-4}, \quad (d) \lim_{x \rightarrow 0} \frac{\sqrt{x+5}-\sqrt{5}}{x}, \quad (e) \lim_{x \rightarrow -2^-} \frac{1}{x+2}$$

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

$$f(x) = \frac{1}{x-2}$$

on the closed interval  $[1, 4]$ . If there are any discontinuities, determine whether they are removable.

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

$$f(x) = \begin{cases} x^3 & x \leq 2 \\ ax^2 & x > 2 \end{cases}$$