Homework I

Due: Mar. 26. (Fri) 23:59 PM

I. REMARK

- Reading materials: Ch 1.1-2.6 in the textbook.
- Don't write just an answer. Please describe enough processes to justify your answer.
- Either Korean or English is totally fine!!.
- "All our dreams can come true if we have the courage to pursue them."

II. PROBLEM SET

1) Graph the function $f(x)$.

$$f(x) = \begin{cases} 4 - x^2, & x \leq 1 \\ x^2 + 2x, & x > 1 \end{cases}$$

2) Graph the function $g(x) = -\frac{1}{2}f(-2x - 3)$. $f(x)$ is given in 1).

3) Graph the function $f(x) = \cos(\pi(x - \frac{1}{2}))$. What is the period of the function?

4) Determine if the function is one-to-one.

$$f(x) = \begin{cases} 3 - x, & x < 0 \\ 3, & x \geq 0 \end{cases}$$

5) The function $f(x)$ is given as $f(x) = x^2 - 2x + 1, x \geq 1$. Find a formula for $g(x) = f^{-1}(x)$. Graph the functions, $f(x)$ and $g(x)$.

6) Prove the limit statements (You must use the definition of limit !!!).
   a) $\lim_{x \to 4} 9 - x = 5$
   b) $\lim_{x \to 9} \sqrt{x - 5} = 2$
   c) $\lim_{x \to 0^+} \frac{1}{\sqrt{x}} = \infty$

7) Find the limits.
   a) $\lim_{x \to \infty} \frac{\sin 2x}{x}$
   b) $\lim_{x \to \infty} \frac{3x+7}{x^2-2}$
   c) $\lim_{x \to 0^+} (\frac{x^2}{2} - \frac{1}{x})$