1. Let $f(x) = x^2 + 2x$. Evaluate:

   (a) $f(2) = 8$

   (b) $f(-3) = 3$

   (c) $f(a) = a^2 + 2a$

   (d) $f(a+b) = a^2 + 2ab + b^2 + 2a + 2b$

   (e) $f(2x) = 4x^2 + 4x$

   (f) $f(-x) = x^2 - 2x$

   (g) $\dfrac{f(x+h) - f(x)}{h} = 2x + 2 + h$

2. Let $g(x) = \dfrac{1}{1-x}$. Evaluate:

   (a) $g(0) = 1$

   (b) $g(1)$ undefined

   (c) $g(x^2) = \dfrac{1}{1-x^2}$

   (d) $g\left(\frac{1}{x}\right) = \dfrac{x}{x-1}$

3. Determine if the following are functions:

   (a)

x	y
-1	9
0	10
1	11
2	12

function

   (b) $\{(0,3), (-2,1), (1,5), (0,-4), (2,-1)\}$ not a function

   (c) $\{(5,7), (-1,6), (0,3), (1,6)\}$ function

   (d) $f(x) = \begin{cases} x+1, & x \geq 1 \\ -x-3, & x \leq 1 \end{cases}$ not a function

4. Find the domain and range of the following functions.

   (a) the horizontal line $y = 4$ Domain: $(-\infty, \infty)$; Range: $\{4\}$

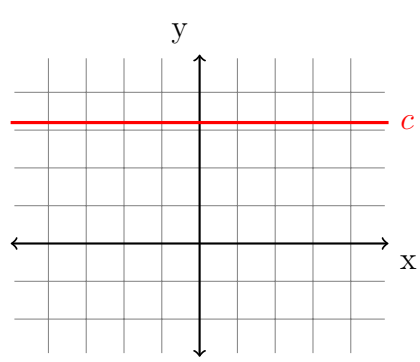
   (b) $\{(0,6), (-1,1), (1,7), (3,-4), (2,0)\}$ Domain: $\{-1,0,1,2,3\}$; Range: $\{-4,0,1,6,7\}$

   (c) $g(x) = \begin{cases} 3, & -5 \leq x < 0 \\ -x, & x > 0 \end{cases}$ Domain: $[-5,0) \cup (0,\infty)$; Range: $(-\infty,0) \cup \{3\}$

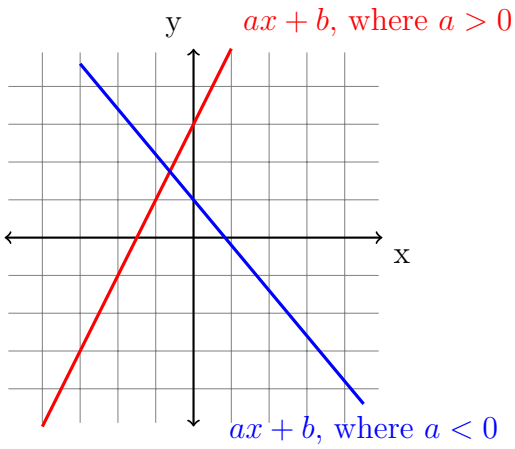
   (d) The relation which assigns to each UH student the last digit of their student ID number. Domain: all UH students; Range: $\{0,1,2,3,4,5,6,7,8,9\}$

Know the graphs of each of the following basic functions.

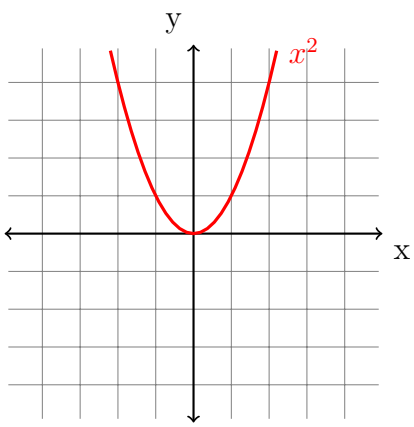
(1) constant function: $f(x) = c$, where c is a real number



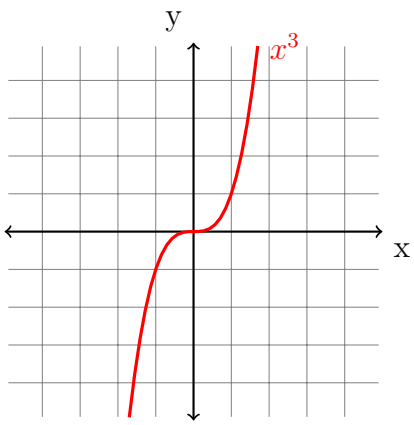
(2) linear function: $f(x) = ax + b$
where a, b are real numbers



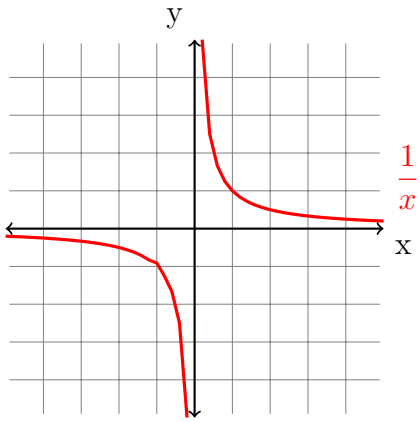
(3) square function: $f(x) = x^2$



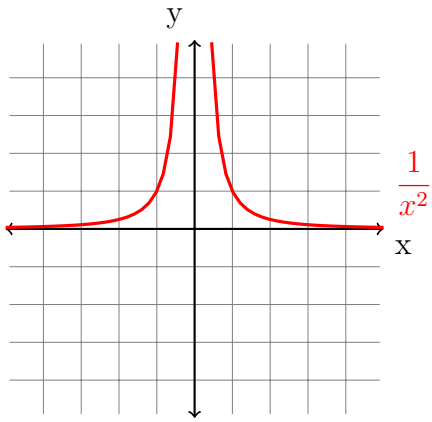
(4) cube function: $f(x) = x^3$



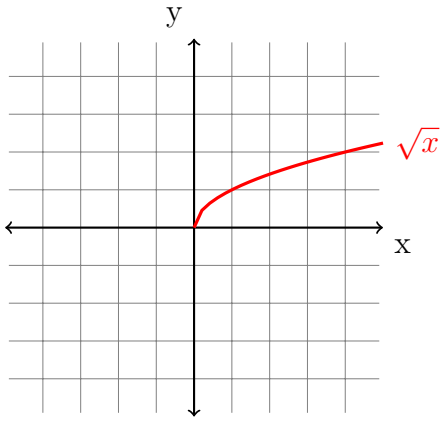
(5) inverse function: $f(x) = \dfrac{1}{x}$



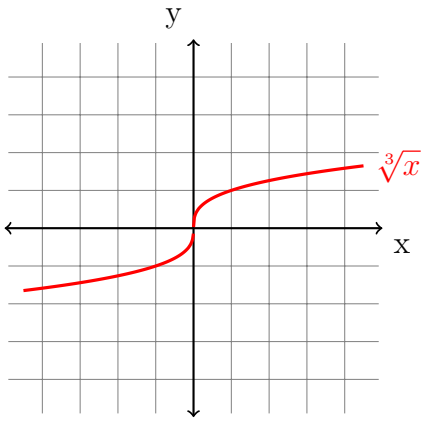
(6) inverse square function: $f(x) = \dfrac{1}{x^2}$



(7) square root function: $f(x) = \sqrt{x}$



(8) cube root function: $f(x) = \sqrt[3]{x}$



(9) absolute value function: $f(x) = |x|$