"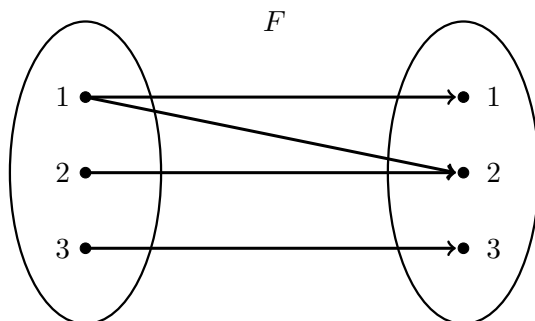[Penny] God, you know, four years I lived with him. Four years—that's like as long as high school. [Sheldon] It took you four years to get through high school?"

— Penny & Sheldon Cooper, Big Bang Theory

Problem 1. (10pts) Determine whether the relations F and G shown below are functions. Be sure to fully justify your answer.

F

x	G
1	1
2	1
3	1
4	1
5	1

Problem 2. (10pts) Determine whether the relations $f(x) = 16 - x^2$ and $g(x, y) = \dfrac{x + y}{x - y}$ are functions. Be sure to fully justify your answer. Also, find $f(5)$ and $g(4, 5)$.

Problem 3. (10pts) Suppose $f(x)$ and $g(x)$ are the functions given below.

$$f(x) = 1 - 4x$$

$$g(x) = x^2 + 1$$

Compute the following:

(a) $6f(1) - g(2)$

(b) $(f + g)(1)$

(c) $(f - g)(0)$

(d) $(fg)(2)$

(e) $(f \circ g)(-1)$

(f) $(g \circ f)(-1)$