# Homework 11

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**Question 1**
A) Function

*Proof*
**First Requirement**
Choose x $\in \mathbb{R}$.
Let y = 3x-5
3, 5, and x are real numbers, so therefore y is a real number
y + 5 = 3x - 5 + 5
= 3x
That means L(x, y)
**Second Requirement**
Choose real numbers x, y, and z and assume that L(x, y) and L(x, z)
so we know y + 5 = 3x and z + 5 = 3x
y + 5 = z + 5
y = z $\square$

B) Partial, but not total function
Counter example for first requirement: (0, 2) $\notin$ P1 but $0 \in \mathbb{Z}$ and $2 \in \mathbb{Z}$

*Proof*
**Second Requirement**
Choose numbers x, y, and z and assume P1(x, y) and p1(x, z)
So we know x * y = 6 and x * z = 6
So x = 6/y and x = 6/z
6/y = 6/z$\square$

C) Partial, but not total function
Counter example for first requirement: (0, 2) $\notin$ P1 but $0 \in \mathbb{Z}$ and $2 \in \mathbb{Z}$

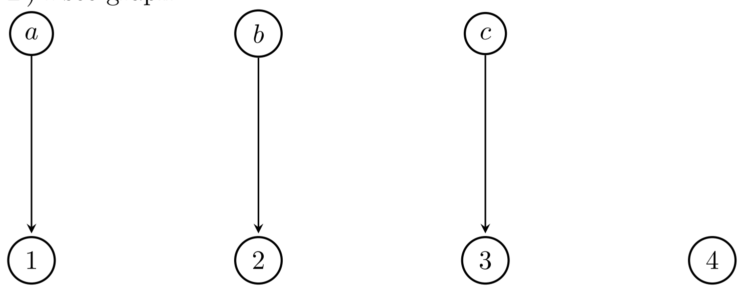
*Proof*
**Second Requirement**
Choose numbers x, y, and z and assume P1(x, y) and p1(x, z)

So we know x * y = 6 and x * z = 6
So x = 6/y and x = 6/z
6/y = 6/z□

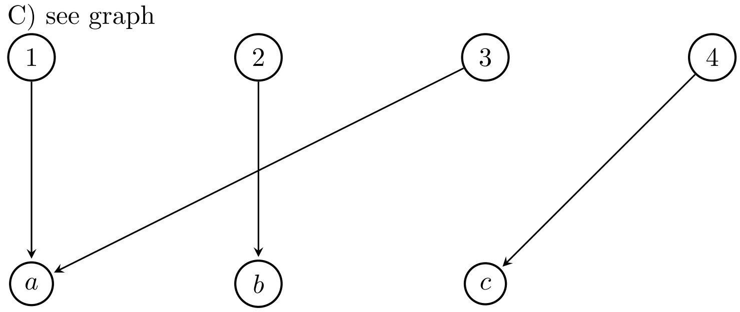
D) Not a function because S("xbox", "hell") and S("xbox", "many") so one input has two outputs therefore not a function

**Question 2**

A) {(a, b), (b, a), (c, b)}
B) Psee graph




C) see graph

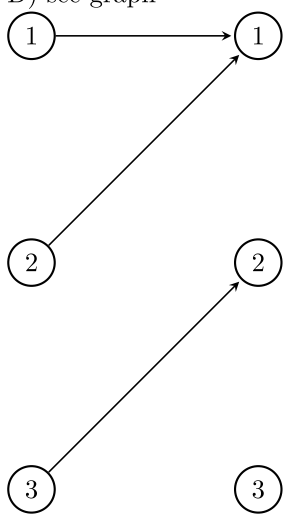



D) f(x) = $x^2$
E) f(x) = $|x^2|$
F) f = {(x, y) | y = number of true assignments in x

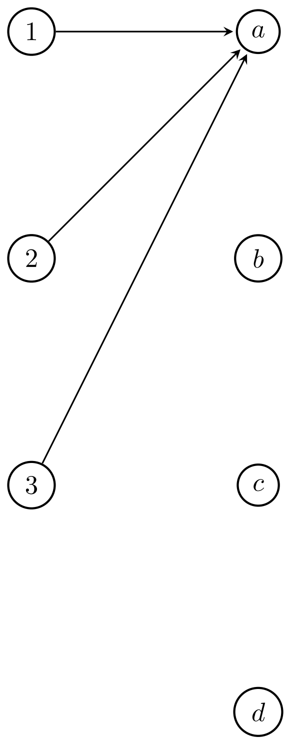
**Question 3**

A) f(x) = x
B) Impossible because if it is not onto, we will not use at least one of our codomains; however, for it to be one-to-one we would need one output to have only one input corresponding to it; therefore making it impossible.
C) Impossible because in in order for the function to NOT be one-to-one, then there must exist an output that has two inputs; however, to be onto, each output (codomain) must have at least one input to map to it. Yet, no input can

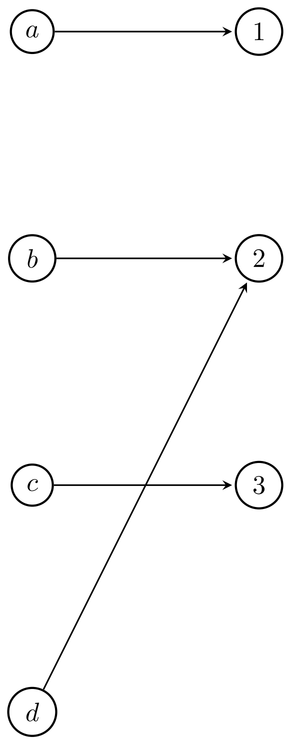
have two outputs
D) see graph



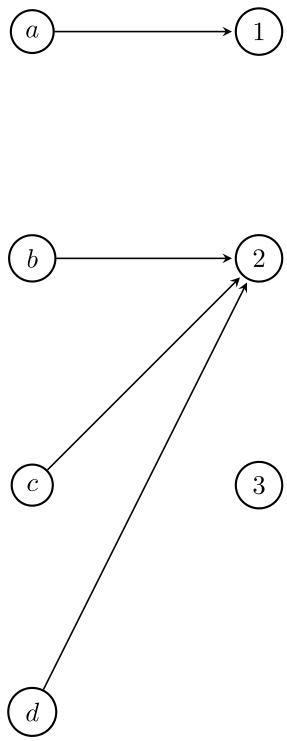
E) f(x) = the letter at index x where the index starts at 1 instead of the usual 0
F) Impossible because there are 3 members of the domain but 4 members of the codomain, meaning that inorder for the domain to be onto, one input would have to have more than one output; therefore, it could not be a function
G) see graph




H) impossible because our domain has 4 inputs but our codomain has 3 outputs, so therefore at least one input will share an output with another input
I) see graph




J) see graph




K) f(x) = x + 1
L) f(x) = $x^4$
M) f(x) = $x^3$ - 9x
N) f = {(x, y) | y = x mod 2}

**Question 4**

A) *Proof*
Choose $x_1$, $x_2 \in \mathbb{R}$ and assume f($x_1$) = f($x_2$)
So 2$x_1$ - 7 = 2$x_2$ - 7
2$x_1$ = 2$x_2$
$x_1$ = $x_2$$\square$

B) *Proof*
Choose y $\in \mathbb{R}$
Let x = (y + 7) / 2
Since y, 2, and 7 are real numbers, so is x
x = (y + 7) / 2
2x = y + 7
2x - 7 = y$\square$

**Question 5**

A) g(6) = 9 and g(0) = 9 so therefore not one-to-one
B) g(-2) = 25, which is equal to $(-2-3)^2$ and any number squared is positive therefore any x where x - 3 ¡ 0 will be positive

**Question 6**

A) h("A-B-C-D") = "ABCD" AND H("A-B—C——D") = "ABCD"
B) h("———")

**Question 7**

A) m({3, 4, 5, 6, 7}) = 3 and m({3, 6, 10, 2000000}) = 3