

Name: \_\_\_\_\_

MATH 100

Fall 2022

HW 1: Due 09/14

*"I can be just as non-competitive as anybody. Matter of fact, I'm the most non-competitive, so I win."*

*– Peter Griffin, Family Guy*

**Problem 1.** (10pt) Showing all the steps according to order of operations, compute the following:

(a)  $10 + 10 - 16 \cdot 0 + 2 + 2$

(b)  $(-1)^3 - 1 + 4^2/2$

(c)  $15 - (6 - 10) + 3^2$

(d)  $\frac{-4 - (2 - 4)^2}{3^2 - 1}$

**Problem 2.** (10pt) Define the following sets:

$$A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

$$B = \{2, 4, 6, 8, 10\}$$

$$C = \{1, 3, 5, 7, 9\}$$

$$D = \{2, 3, 5, 7\}$$

$$E = \{2, 3, 4, 6, 8, 9\}$$

Consider all these sets as subsets of  $A$ . Compute the following:

(a)  $B^c$

(b)  $B \cup D$

(c)  $E \setminus D$

(d)  $C \cap E$

(e)  $|A|$

**Problem 3.** (10pt) Define the following sets:

$A$  = All males over 40 years old.

$B$  = All people that have acted in a movie.

$C$  = All US Presidents, alive or dead.

$D$  = All persons under 6 ft tall.

Consider all of these sets as subsets of the set of all people alive. Being sure to completely justify your response, answer the following:

(a) Find an element of  $A \cap B$ .

(b) Is Jeff Bezos  $\in A \cup C$ ? Is Jeff Bezos  $\in C \cup D$ ?

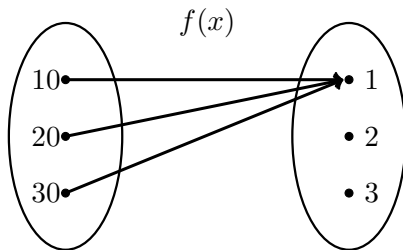
(c) Is George Washington  $\in C - B$ ?

(d) Is Danny Devito  $\in D^C$ ?

(e) Are sets  $B$  and  $C$  disjoint? [Hint: Consider US Presidents from the last 50 years.]

**Problem 4.** (10pt) Determine whether the following relations are functions, being sure to justify your answer. If the relation is a function, determine its domain, codomain, and range. [For this problem, in determining a functions domain, codomain, and range, you may invoke the use/description of a graph.]

(a)



(b)

$x$	$g(x)$
1.0	1.0
1.5	4.3
3.0	-6.1
4.4	2.2
6.8	1.0

(c)  $h(x, y) = x + y^4$ .

(d)  $j(x) =$  the multiple of two closest to  $x$ .

**Problem 5.** (10pt) Suppose that  $f(x, y)$  is the function given by the following table:

$x \backslash y$	1	2	3	4
1	-2	7	4	-4
2	0	3	-1	1
3	5	-6	7	6
4	1	0	4	0

Showing all your work, compute the following:

(a)  $f(3, 2)$

(b)  $f(3 - 1, 2^2)$

(c)  $5f(3, 1) - 8$

(d)  $\frac{4 - f(3^2 + (-2)^3, 1)}{2f(1, 3)}$

**Problem 6.** (10pt) Let  $\text{rdwn}(x)$  denote the largest integer that is *less than*  $x$ .

- (a) Find  $\text{rdwn}(x)$  for  $x = 0.5, 2.2, 5.9, 6.0, -1.5, -4.9, -7$ .
- (b) Explain why  $\text{rdwn}(x)$  is a function.
- (c) Being as accurate as possible, sketch a graph of  $\text{rdwn}(x)$  on the plot below.

