Problem Set

3. Let L: Animal→Counting numbers

   Assign each animal to its number of legs.

   F: People →Animals

   Assign to each person to his favorite animal.

   N: People →Alphabet

   Assign each person to the first letter of her name.

   A: Alphabet→Counting numbers

   Assign each letter to the corresponding number 1–26.

   S: Counting numbers→Counting numbers

   Assign each number its square.

   Which of the following compositions are defined? For those that are, describe the effect of the composite function.

   a. $L \circ F$
   b. $N \circ L$
   c. $F \circ L$
   d. $S \circ L \circ F$
   e. $A \circ A \circ N$

a. $L(F(x))$: Defined; assigns people to counting #
   People $\xrightarrow{F}$ Animals $\xrightarrow{L}$ Counting #s

b. $N(L(x))$: Not defined
   Animal $\xrightarrow{L}$ Counting #s People $\xrightarrow{N}$ Alphabet

c. $F(L(x))$: Not defined
   Animal $\xrightarrow{L}$ Counting #s People $\xrightarrow{F}$ animals

d. $S(L(F(x)))$: Assigns people to counting #s Defined
   People $\xrightarrow{F}$ Animals $\xrightarrow{L}$ Counting #s $\xrightarrow{S}$ Counting #s

e. $A(A(N(x)))$: Not Defined
   People $\xrightarrow{N}$ Alphabet Alphabet $\xrightarrow{A}$ Counting #s Alphabet $\xrightarrow{A}$ Counting #s

4. Suppose a flu virus is spreading in a community. The following table shows the number of people, n, who have the virus d days after the initial outbreak. The number of people who have the virus is a function of the number of days, $n = f(d)$.

d days	0	1	4	8	12	16	20
$n = f(d)$ number of people infected	2	4	14	32	64	50	32

There is only one pharmacy in the community. As the number of people who have the virus increases, the number of boxes of cough drops, b, sold also increases. The number of boxes of cough drops sold on a given day is a function of the number of people who have the virus, $b = g(n)$, on that day.

n number of people infected	0	2	4	9	14	20	28	32	44	48	50	60	64
$b = g(n)$ number of boxes of cough drops sold	1	5	14	16	22	30	42	58	74	86	102	124	136

a. Find $g(f(1))$, and state the meaning of the value in the context of the flu epidemic. Include units in your answer. $f(1)=4$ $g(4)=14$ one day into the outbreak, 14 boxes are sold

b. Fill in the chart below using the fact that $b = g(f(d))$.

d (days)	0	1	4	8	12	16	20
b number of boxes of cough drops sold	5	14	22	58	136	102	58

c. For each of the following expressions, interpret its meaning in the context of the problem, and if possible, give an approximation of its value.

i. $g(f(4))$: $f(4)=14$ people $g(14)=22$ boxes sold on day 4.

ii. $g(f(16))$ $f(16)=50$ people $g(50)=102$ box sold on day 16

iii. $f(g(9))$ $g(9)=16$ boxes $f(16)$: not defined b/c f can't take boxes as input.

Name:

Composition Homework Part 2

1. Let $M(p)$: People→Movie

   Assign each person to its favorite movie

   A: Actor →Age

   Assign to each actor his or age

   G: Movie →Genre

   Assign each movie to its genre

   T: Genre→Actor

   Assign each genre to an actor associated with that genre

   L: Movie→Counting numbers

   Assign each movie to the number of letters in its title

   Which of the following compositions are defined? For those that are, describe the effect of the composite function.

   a. $A \circ L$ A(L(x)= not defined
   b. $G(M(p))$: Defined; assigns people to a genre
   c. $A \circ T$: A(T(x)): assigns a genre to an age Defined
   d. $L \circ A \circ T$: L(A(T(x))): Not defined
   e. $T \circ G \circ M$: T(G(M(x))): Defined assigns people to an actor.