Activity 3 - Numerical Function Composition

At this point, we've developed an understanding of function composition, and, using visual examples, we have seen how certain function compositions cannot be constructed. The reasoning used in the visual examples of Activity 1 (that involved a comparison of inputs and outputs) can be applied to functions expressed in their usual forms: algebraically, graphically, and numerically. In this activity, we will use functions represented numerically to explore when functions can and cannot be constructed.

Part I - Consider f(x) and g(x) below.

x	1	3	9	12	18	29	34	45
$f(x)$	-3.5	6	78	-21	20.3	16	27	35

x	5	8	19	22	28	35	37	48
$g(x)$	1	18	9	34	3	29	12	45

    a. Find $f(g(5))$
    b. Find $f(g(8))$
    c. Find $f(g(19))$
    d. Find $f(g(22))$
    e. Find $f(g(28))$
    f. Find $f(g(35))$
    g. Find $f(g(37))$
    h. Find $f(g(48))$
    i. What is the domain of $(f \circ g)(x)$?
    j. Find x such that $f(g(x)) = 27$
    k. Find x such that $f(g(x)) = 35$
    l. Use the table below to construct the new function, $(f \circ g)(x)$.

x	5	8	19	22	28	35	37	48
$(f \circ g)(x)$								

Part I I- Consider $f(x)$ and $h(x)$ below.

x	1	3	9	12	18	29	34	45
$f(x)$	-3.5	6	78	-21	20.3	16	27	35

x	-1	0	6	11	15	18	25	31
$h(x)$	0	2	-8	15	28	-30	-45	56

a. For what x value can we find an output for $f(h(x))$?
b. What can we conclude about the composition $(f \circ h)(x)$?

Part III- Consider $f(x)$ and $k(x)$ below.

x	1	3	9	12	18	29	34	45
$f(x)$	-3.5	6	78	-21	20.3	16	27	35

x	-4	-2	5	9	12	20	34	40
$k(x)$	3	-5	12	0	1	-34	3	21

a. Find $f(k(-4))$
b. Find $f(k(-2))$
c. Find $f(k(5))$
d. Find $f(k(9))$
e. Find $f(k(12))$
f. Find $f(k(20))$
g. Find $f(k(34))$
h. Find $f(k(40))$
i. What is the domain of $(f \circ k)(x)$? What is the range of $(f \circ k)(x)$?

j. Solve for x in $f(k(x)) = -21$

k. Solve for x in $f(k(x)) = -3.5$

l. Use the table below to construct a new function $(f \circ k)(x)$. (Note that not all columns may be used)

x							
f(k(x))							

m. Using the newly recreated table, double-check your answers from parts j and k.