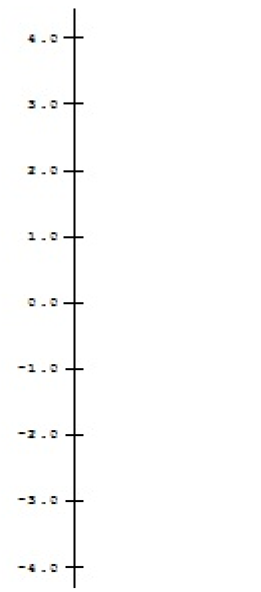
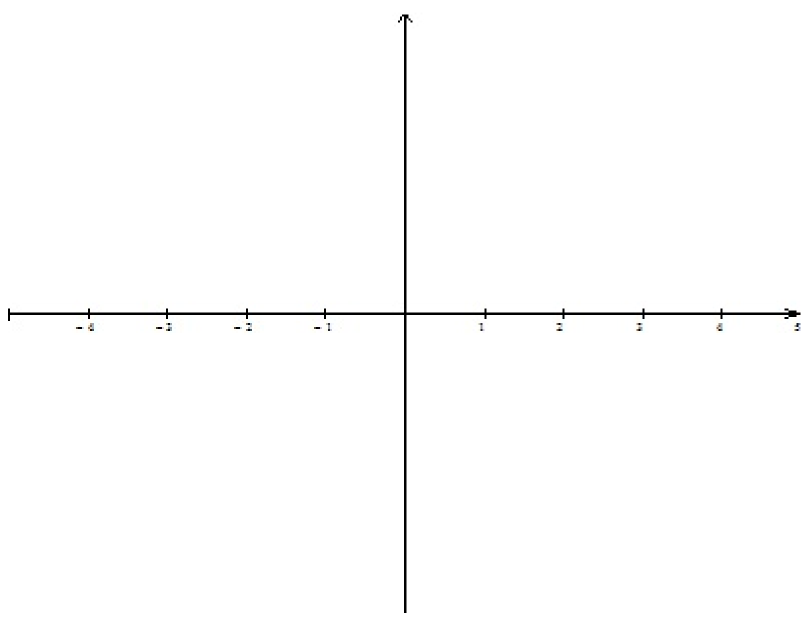
A.1 **Suppose *f is a function* determined by the following table** :

t	-4	-3	-2	-1	0	1	2	3	4
***f*(*t*)**	-5	-2	0	3	6	3	2	-5	0

A.2. Complete the following mapping figure for *f* with the indicated numbers (determine an appropriate scale for the target values.)



A.3 Sketch a "graph" for *f* based on the chart (determine an appropriate scale for the vertical axis.):

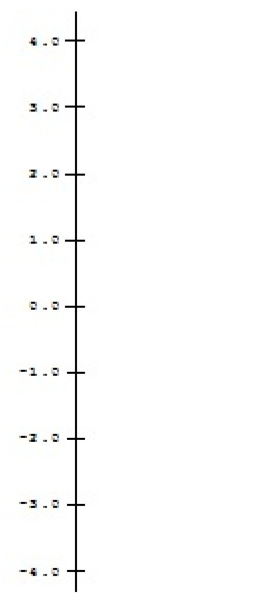


B. Suppose that $f(x) = 5x - 7$ for all $x \in \mathbb{R}$.

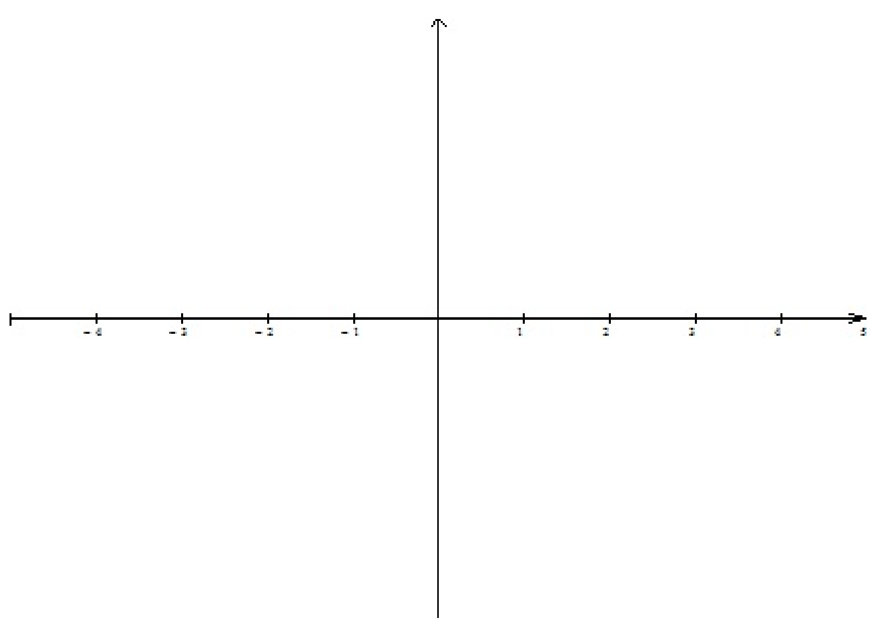
B.1. Complete the following table :

x	-3	-2	-1	0	1	2	3
***f*(*x*)**							

B.2. Complete the following mapping figure for f with the indicated numbers (determine an appropriate scale for the target values.):



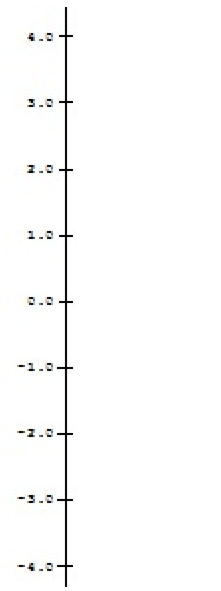
B.3. Sketch a graph for f based on the chart (determine an appropriate scale for the vertical axis.):



C. 1. Solving a linear equation: $2x+1 = 5$

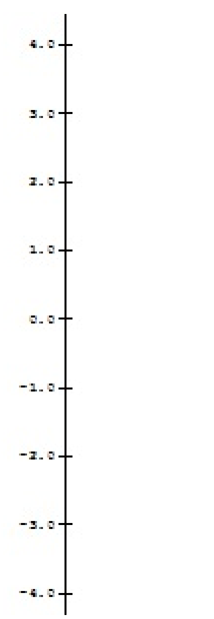
$$2x+1 = x + 2$$

$f(x) = 2x+1$
$g(x) = x+2$
For which x does $f(x) = 5$?
For which x does $f(x) = g(x)$?
Solution: Sketch mapping figures for *f* and *g* on the same axes.
[Use the same scale for the second axis.]
[Use distinguishing arrows of some kind for the different functions.]
Describe the visual feature of the figures that identifies x where $f(x) = g(x)$.



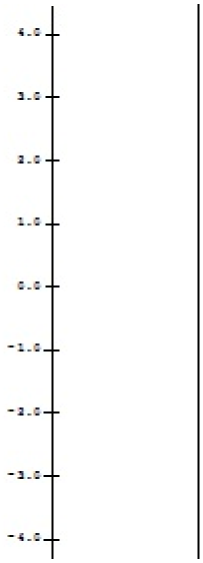
Does this feature depend on the axis scales?

C. 2. Find "fixed points" of f : $f(x) = 2x+1$
For which x does $f(x) = x$?
Solution: Sketch a mapping figure for *f*. [Use the same scale for the second axis.]
Describe the quality of the figure that identifies x where $f(x) = x$.

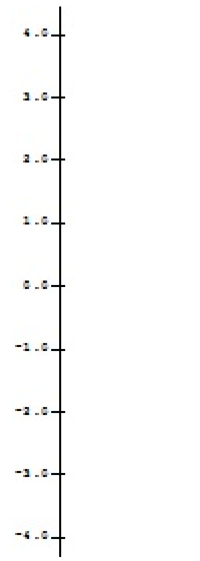


D. Let $\boldsymbol{f}(\mathbf{x}) = \mathbf{mx + b}$ sketch mapping figures for the following:
Use the same scale for the second axis.

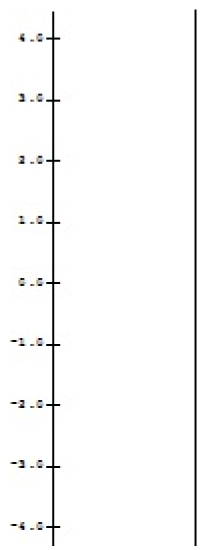
D.1: m = -2; b = 1: $f(x) = -2x + 1$



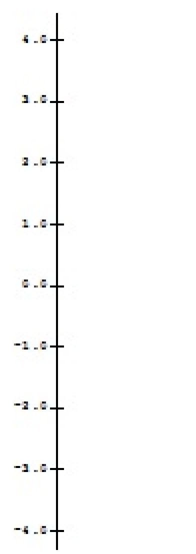
D.2: m = 2; b = 1: $f(x) = 2x + 1$



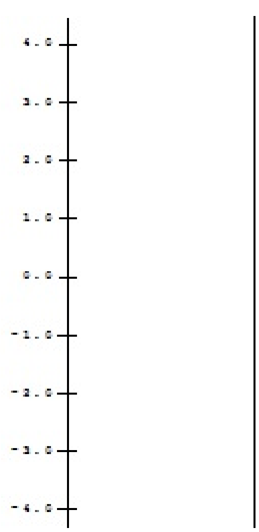
D.3: m = ½; b = 1: $f(x) = ½\, x + 1$



D.4: m = 0; b = 1: $f(x) = 0\, x + 1$



D.5: m = 1; b = 1: $f(x) = x + 1$



Using the focus point to solve a problem. [Use the same scale for the second axis.]

E 1.Solving a linear equation: $2x+1 = 5$ $2x+1 = x + 2$

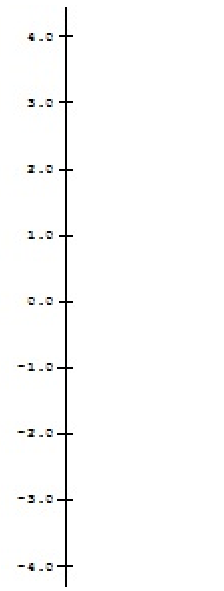
$f(x) = 2x+1$ $g(x) = x+2$

For which x does f(x) = 5; f(x) = g(x)?

Solution: Find the focus points [2,1] for *f* and [1,2] for *g*.

Use [2,1] and [1,2] to find the solutions.

What visual feature of [2,1] and [1,2] identified x where *f* (x) = *g* (x)?

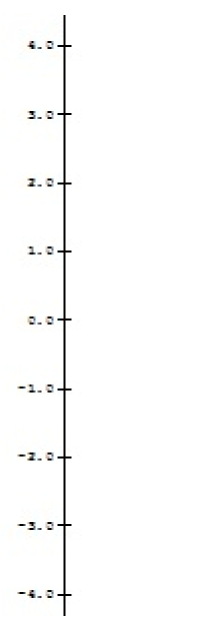


E. 2. Find "fixed points" of *f* : *f* (x) = 2x+1

For which x does *f* (x) = x?

Solution: Find the focus point [2,1] for *f*. Use [2,1] to find the solution.

What visual feature of [2,1] identified x where *f* (x) = x?



Morning and Lunch Break: Think about These Problems:

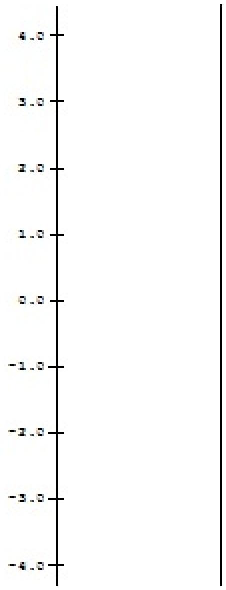
M.1 How would you use the Linear Focus to **find the mapping figure for the function inverse for a linear function when m≠?0?**

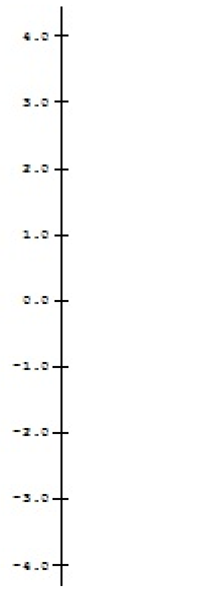
M.2 How does the **choice of axis scales** affect the **position of the linear function focus point** and its use in solving equations?

M.3 Describe the visual features of the mapping figure for the quadratic function $f(x) = x^2$.
How does this generalize for *even* functions where **$f(-x) = f(x)$?**

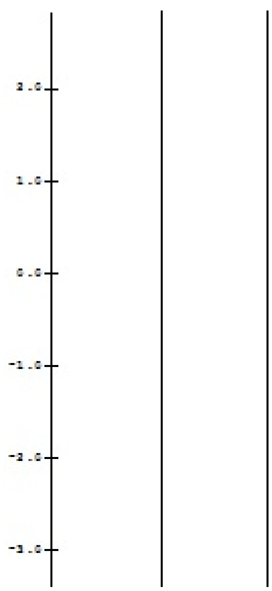
M.4 Describe the visual features of the mapping figure for the cubic function $f(x) = x^3$.
How does this generalize for *odd* functions where **$f(-x) = -f(x)$?**

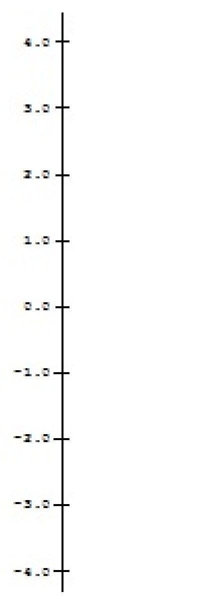
F.1 On separate figures sketch mapping figures for g(*x*) = 2*x* and h(*x*)= *x*+1



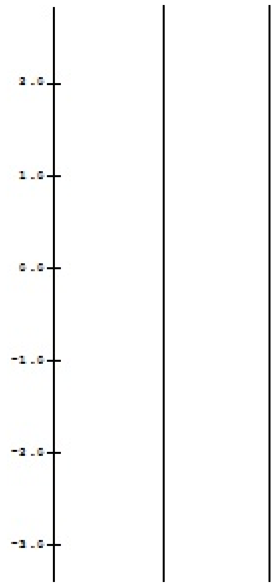


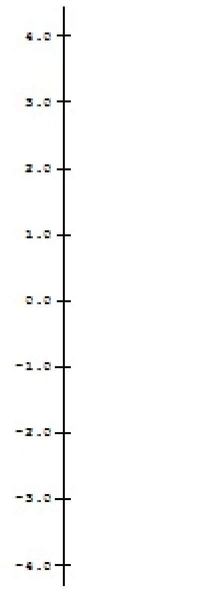
F.2 Use these sketches to draw a composite sketch of the mapping figure for the composite function f(x) = h(g(x)) =(2x) + 1 and then a sketch for the mapping figure of f(x) = 2 x + 1

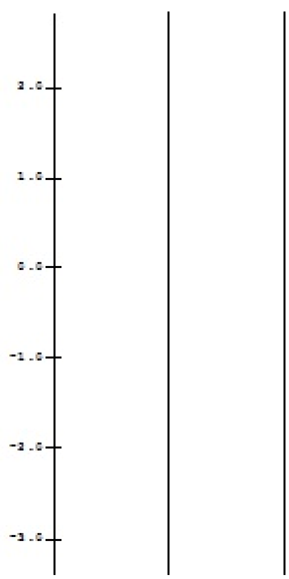


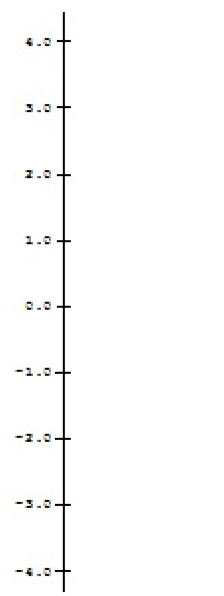


F. 3 Use these sketches to draw a composite sketch of the mapping figure for the composite function p(x) = g(h(x)) =2(x + 1) and then a sketch for the mapping figure of p(x) = 2(x + 1) = 2x +2





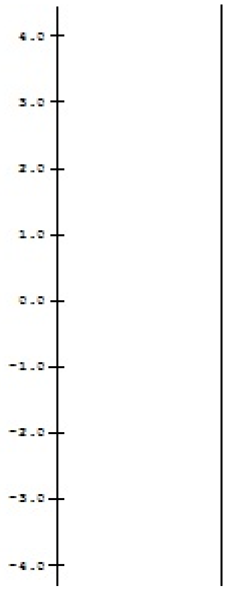


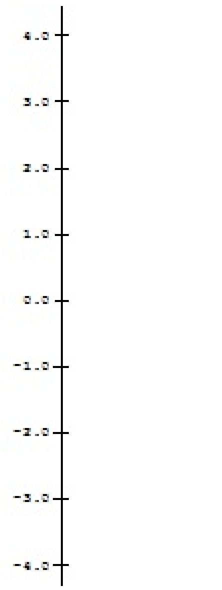


G Inverse linear functions:

G.1 Make a transparency for mapping figures for g(*x*) = 2*x* and h(*x*)= *x*+1. Flip the transparency over and use this on separate figures to sketch mapping figures for

invg(*x*) = 1/2 x and Invh(*x*)= *x*-1

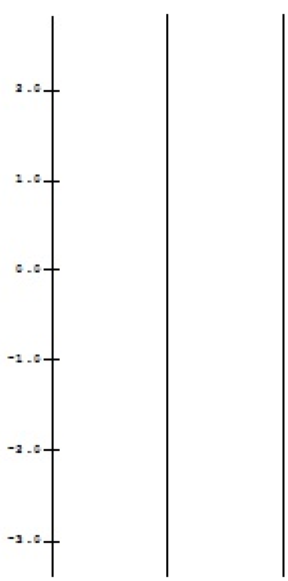


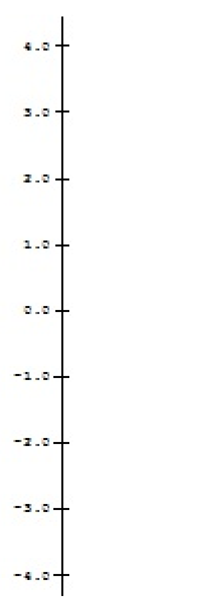


"Socks and shoes" with mapping figures

G.2 Use these sketches to draw a composite sketch of the mapping figure for the composite function invf(x) = invh(invg(x)) =1/2(x - 1) and then a sketch for the mapping figure of

invf(x) = 1/2(x - 1) = 1/2x -1/2





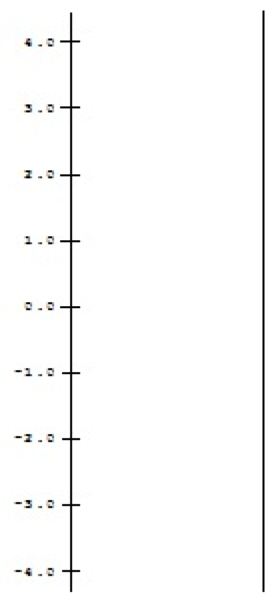
Quadratic Functions : Tables. Mapping Figures, Graphs.

Suppose that $g(u) = 6 - u - u^2$ for all $u \in \mathbb{R}$.

H.1 Complete the following table :

u	-3	-2	-1	0	1	2	3
$g(u)$							

H.2. Complete the following mapping figure for g with the indicated numbers (determine an appropriate scale for the target values.):



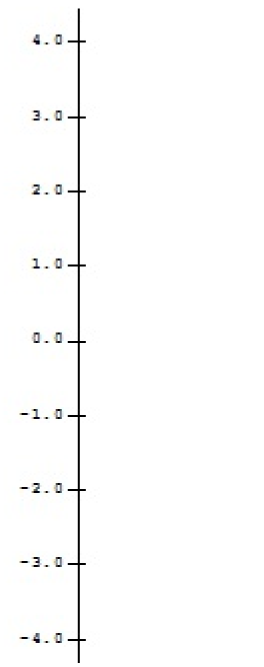
Exponential Functions : Tables. Mapping Figures, Graphs.

Suppose that $g(u) = 2^u$ for all $u \in \mathbb{R}$.

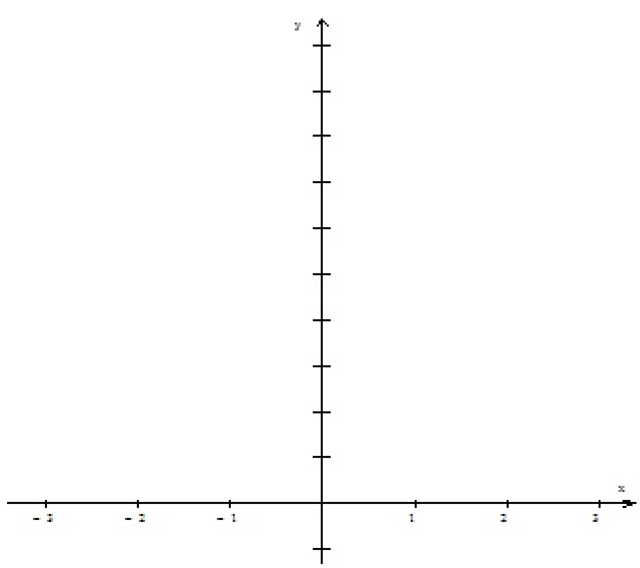
I.1 Complete the following table :

u	-3	-2	-1	0	1	2	3
g(*u*)							

I.2. Complete the following mapping figure for *g* with the indicated numbers (determine an appropriate scale for the target values.):

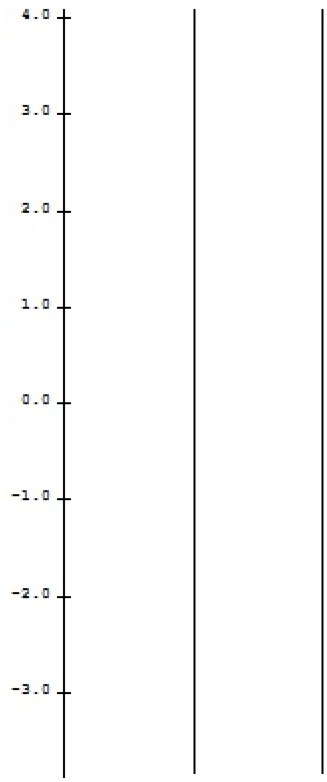


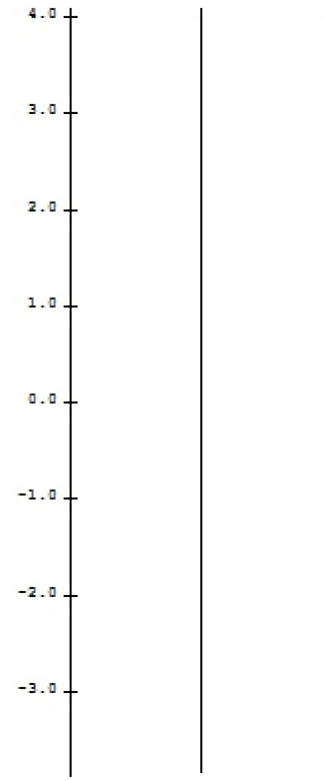
I.3. Sketch a graph for *g* based on the chart (determine an appropriate scale for the vertical axis.):



I. 4. Suppose $f(x) = 3*2^x$ and $g(x) = f(x) - 3$.

A. Sketch mapping figures that visualize *f* and *g* as compositions of an exponential function followed by a linear function. (determine an appropriate scale for the target values.).



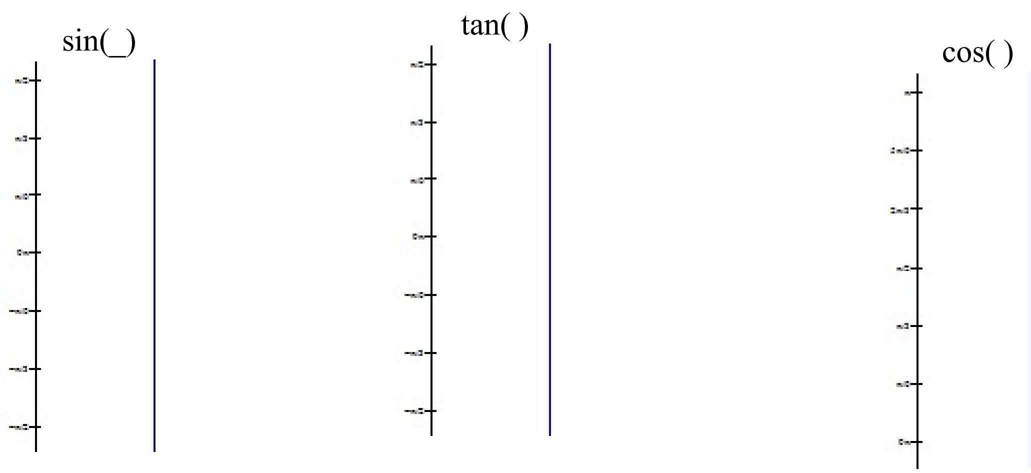


Trig and Inverse Functions : Tables. Mapping Figures, Graphs.

J.1 Complete the following tables :

t	**-π/2**	**-π/3**	**-π/4**	**-π/6**	**0**	**π/6**	**π/4**	**π/3**	**π/2**
sin(*t*)									
tan(*t*)	****								****
t	**0**	**π/6**	**π/4**	**π/3**	**π/2**	**2π/3**	**3π/4**	**5π/6**	**π**
cos(*t*)									

J.2. Complete the following mapping figures for sine, tangent and cosine with the numbers from your tables (determine an appropriate scale for the target values).

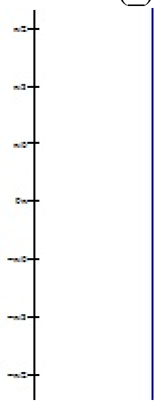


J.3. Complete the following tables for the inverse sine, inverse tangent and inverse cosine functions:

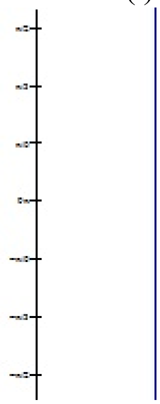
x	**-1**	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	**-1/2**	**0**	**1/2**	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	**1**
arcsin(*x*)									
x	****	$-\sqrt{3}$	**-1**	$-\frac{\sqrt{3}}{3}$	**0**	$\frac{\sqrt{3}}{3}$	**1**	$\sqrt{3}$	****
arctan(*x*)	****								****
x	**-1**	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	**-1/2**	**0**	**1/2**	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	**1**
arccos(*x*)									

J. 4. Complete the following mapping figures for arcsine, arctangent and arccosine with the numbers from your tables (determine an appropriate scale for the target values).

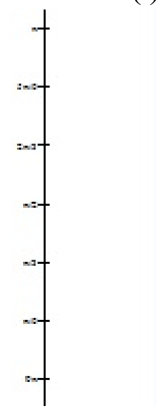
arcsin(_)



arctan( )



arccos( )



J.5. Explain briefly how the mapping figures for sine, cosine, and tangent are related to the mapping figures for arcsine, arctangent, and arccosine.

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____

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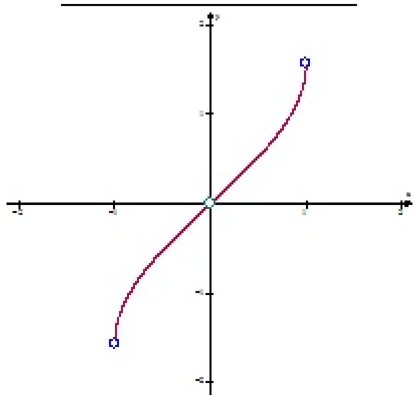
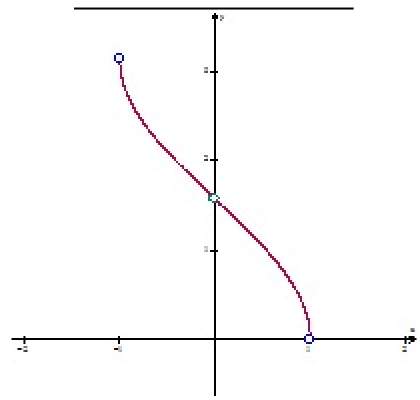
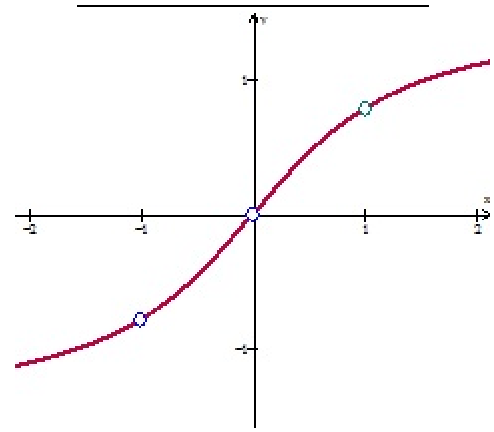
J.6. Below are the graphs for the arcsine, arccosine, and arctangent functions.
Label each appropriately and indicate the coordinates for three points on each graph.
Reflect each graph on the line *y* = *x* to show the related core function.



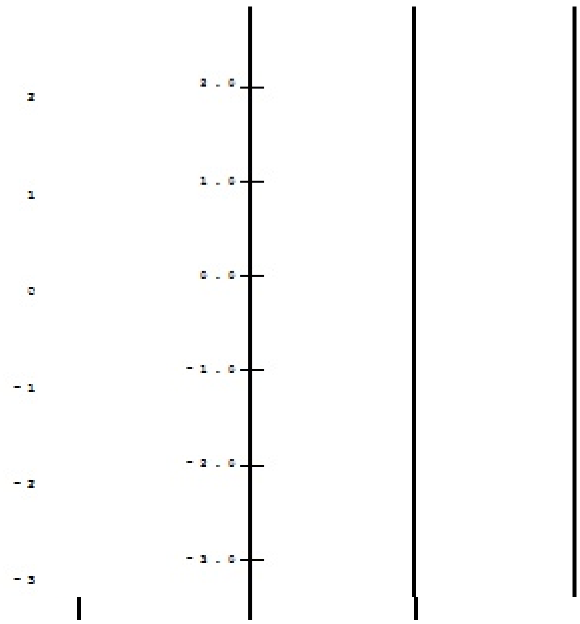




K. Compositions

Suppose *f*(*x*) = 3sin(2x+π/3) +2.

A. Sketch mapping figures that visualize *f* as compositions of the sine function preceeded and then followed by a linear function. (determine an appropriate scales for the various axex.).



B. Use your mapping figure to determine the amplitude, period and phase shift for this "sine wave". Sketch a graph for *f*.