2.6E Domain of Composition: From Graphs

Note: This method is different from that used for output formulas!

A. Method for Finding $\mathcal{dom}(f \circ g)$ Graphically

1. Find $\mathcal{dom}\, f$ from the graph. [*the left function!*]

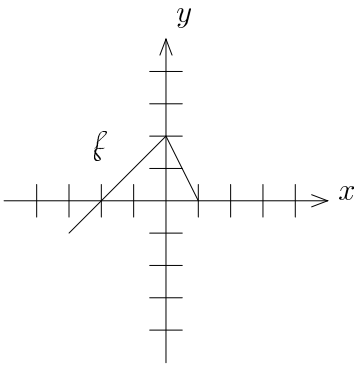
2. Draw $\mathcal{dom}\, f$ on the y-axis of the graph of g.

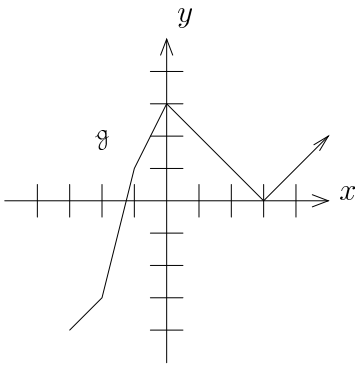
3. Throw away the parts of g that are not inside the "bands" determined by the y-axis marks.

4. Read off the domain of the new "mutilated" graph of g.

B. Examples

Example 1: Find $\mathcal{dom}(f \circ g)$ where f and g are given by the following graphs:

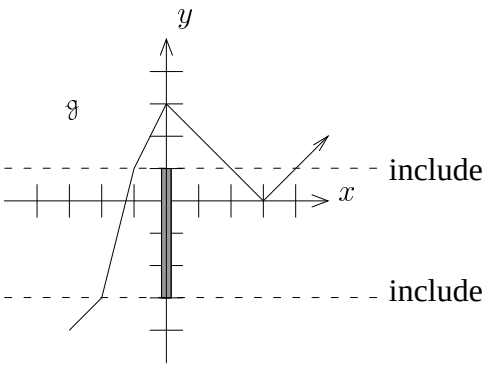




Solution

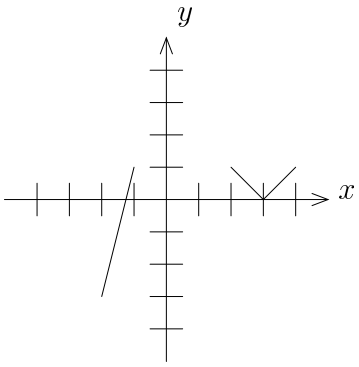
1. From the graph, $\mathcal{dom}\, f = [-3, 1]$.

2. Mark $\mathcal{dom}\, f$ on the y-axis of the graph of g:



Band determined by $\mathcal{dom}\, f$
Throw away everything outside

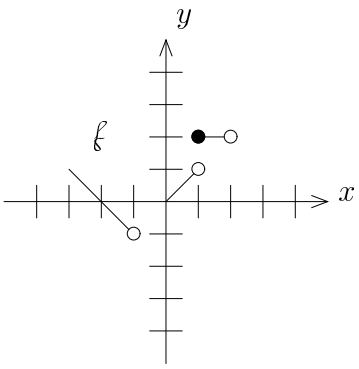
3. "Mutilated" graph of g:

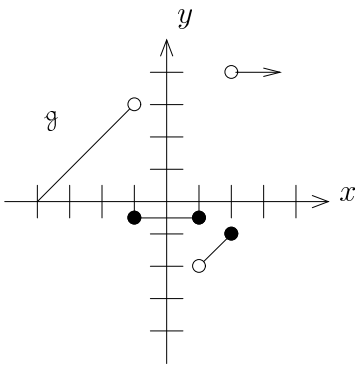


4. Now read off the domain:

Ans $\boxed{\mathcal{dom}(f \circ g) = [-2, -1] \cup [2, 4]}$

Example 2: Find $\mathcal{dom}(f \circ g)$ where f and g are given by the following graphs:

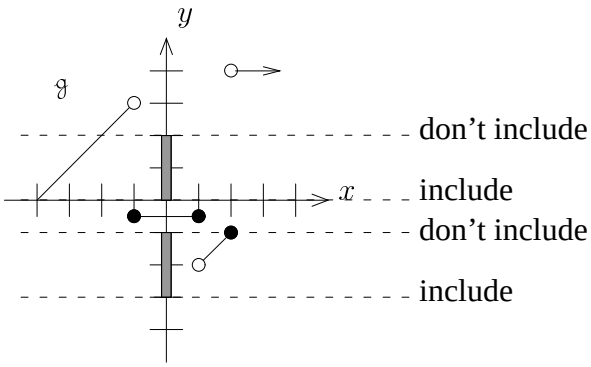




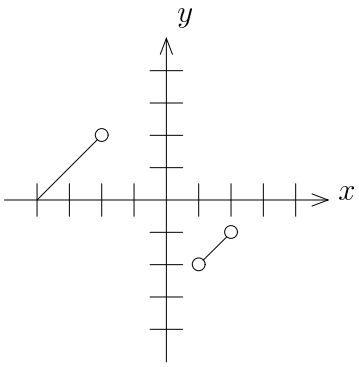
Solution

1. From the graph, $\mathrm{dom}\, f = [-3, -1) \cup [0, 2)$.

2. Mark $\mathrm{dom}\, f$ on the y-axis of the graph of g:



3. "Mutilated" graph of g:



4. Now read off domain:

Ans $\boxed{\mathrm{dom}(f \circ g) = [-4, -2) \cup (1, 2)}$