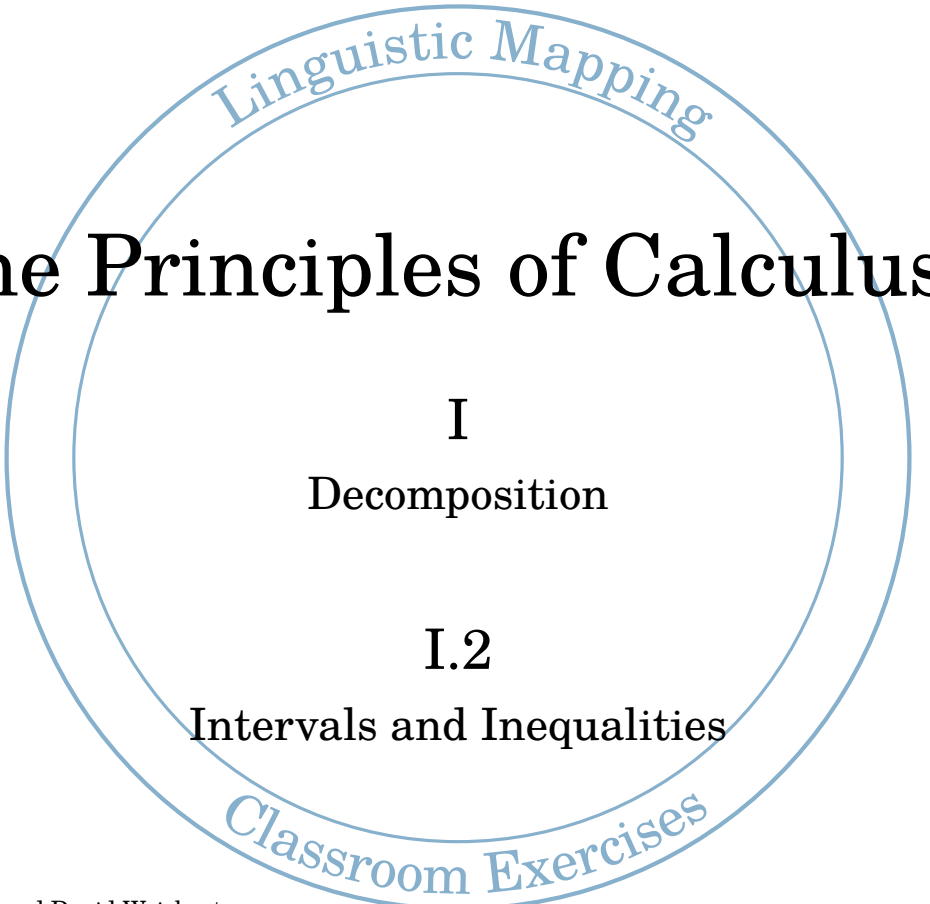


The Principles of Calculus I

I

Decomposition

I.2

Intervals and Inequalities

Copyright © 2024 by Bryan Carrillo and David Weisbart.

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from Bryan Carrillo and David Weisbart.

Exercise 1

Write in plain English how you would refer to the intervals that these symbols represent:

(a) $(1, 5)$;

(b) $(1, 5]$;

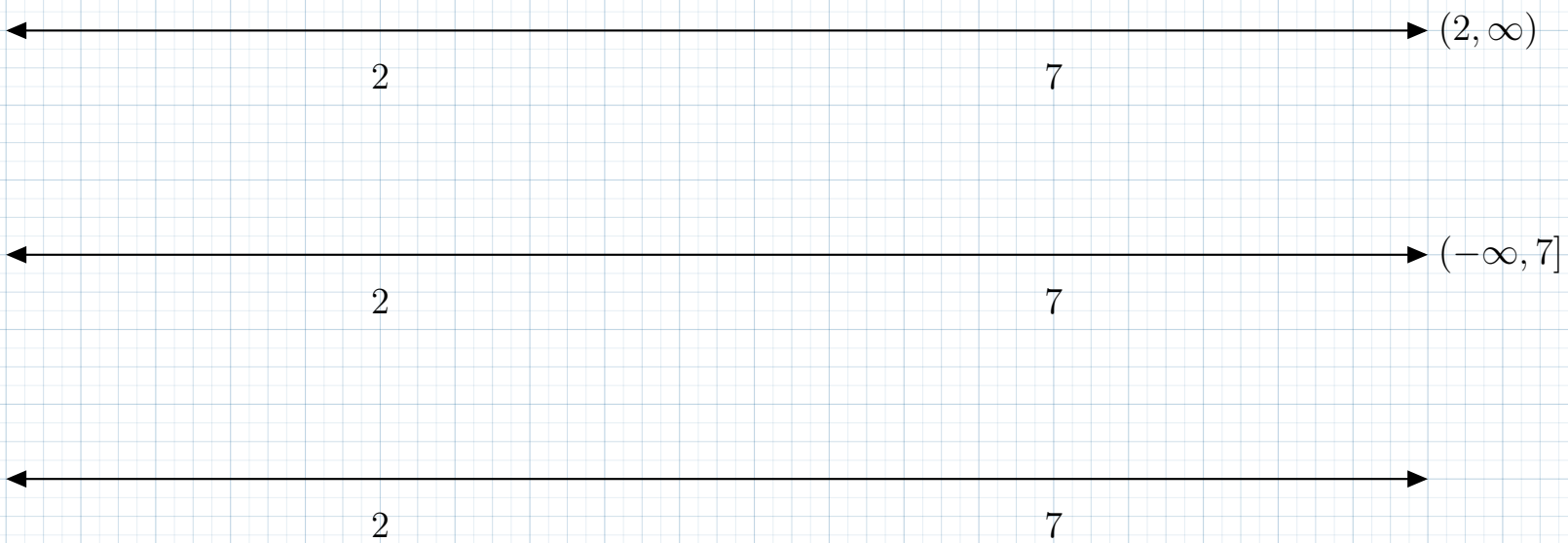
(c) $[1, 5)$;

(d) $[1, 5]$.

Copyright © 2024 by Bryan Carrillo and David Weisbart.

Exercise 2

Sketch the intervals $(2, \infty)$ and $(-\infty, 7]$ as subsets of the real number line, and determine their intersection.



Copyright © 2024 by Bryan Carrillo and David Weisbart.

Exercise 3

Use set builder notation to describe these intervals:

$$(-2, 7), \quad (-2, 7], \quad [-2, 7), \quad \text{and} \quad [-2, 7].$$

Copyright © 2024 by Bryan Carrillo and David Weisbart.

Exercise 4

Describe each of these intervals as an intersection of two unbounded intervals:

$$(-3, 4), \quad (-3, 4], \quad [-3, 4), \quad \textbf{and} \quad [-3, 4].$$

Copyright © 2024 by Bryan Carrillo and David Weisbart.

Exercise 5

Take A to be the solution set to the compound inequalities

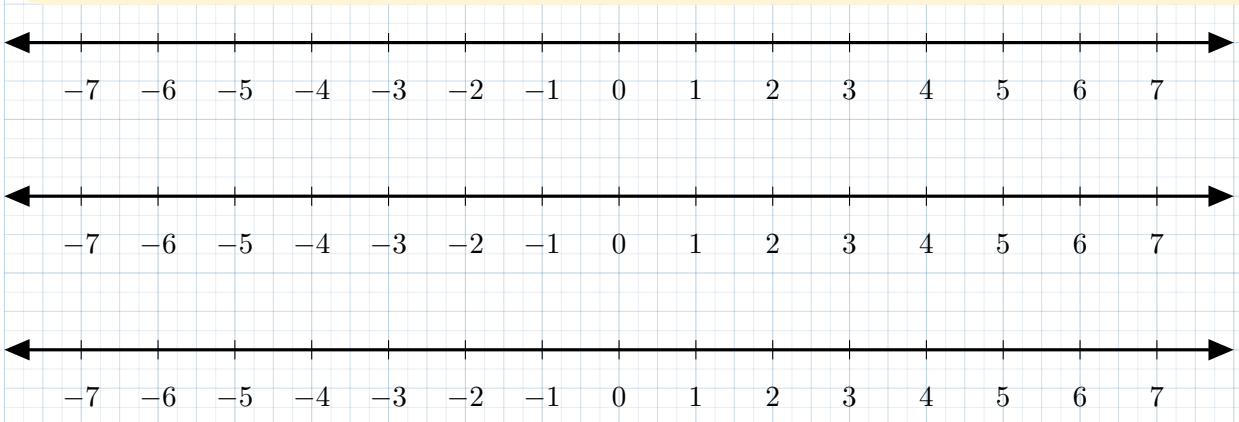
$$2x + 1 > -9 \quad \textbf{and} \quad 2x < x + 7.$$

Take B to be the solution set to the compound inequalities

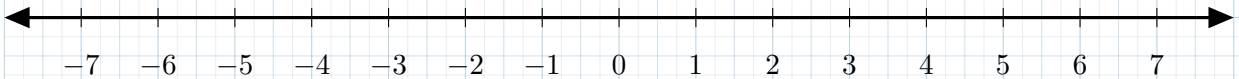
$$2x > 3x + 2 \quad \textbf{or} \quad x \geq 4.$$

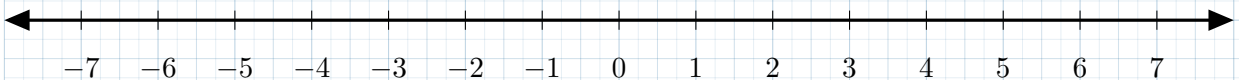
Determine the set X of all real numbers that satisfy the conditions that determine both solution sets A and B.

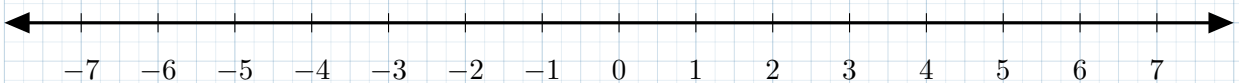
Reflect on how you used the Principle of Decomposition and the language of sets to solve this problem.

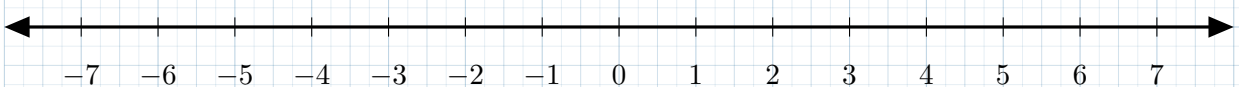


Copyright © 2024 by Bryan Carrillo and David Weisbart.









Copyright © 2024 by Bryan Carrillo and David Weisbart.

Exercise 6

Take A to be the solution set to the compound inequalities

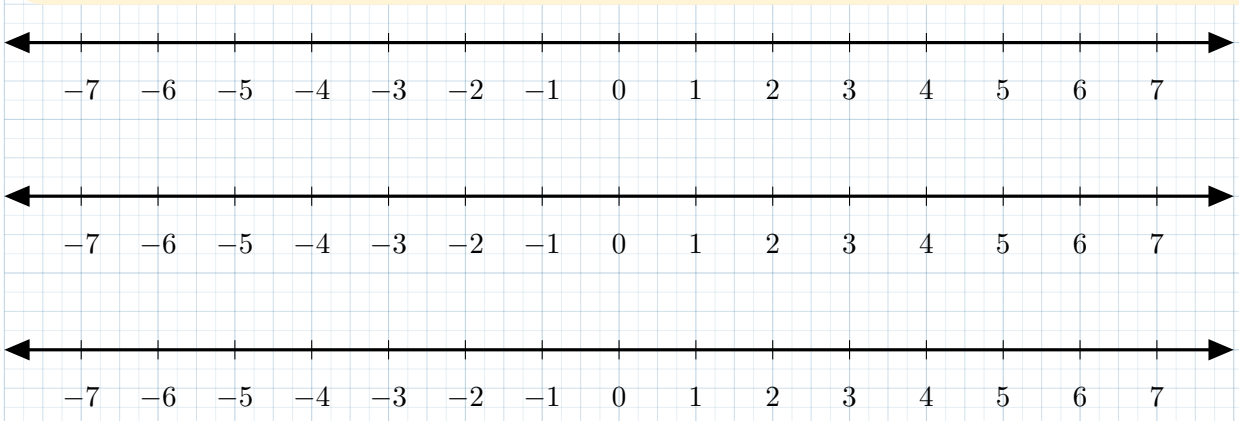
$$2x + 1 > -9 \quad \textbf{and} \quad 2x < x + 7.$$

Take B to be the solution set to the compound inequalities

$$2x > 3x + 2 \quad \textbf{or} \quad x \geq 4.$$

Determine the set Y of all real numbers that satisfy the conditions that determine either of the solution sets A and B.

Reflect on how you used the Principle of Decomposition and the language of sets to solve this problem.



Copyright © 2024 by Bryan Carrillo and David Weisbart.

Copyright © 2024 by Bryan Carrillo and David Weisbart.