

**Exercise 6**

*Yes or No?* If *No*, give a reason. Assume that  $a$  and  $b$  are nonzero real numbers.

- (a) Is the sum of two rational numbers always a rational number?
  - (b) Is the sum of two irrational numbers always an irrational number?
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**Solution**

(a) Yes.

(b) No.

The sum of two rational numbers is always a rational number

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$$

because both  $ad + bc$  and  $bd$  are integers. Consider the two irrational numbers,  $\pi$  and  $-\pi$ ; their sum is 0, which is a rational number.