For this project, we are going to ask you to express several different important properties of addition and multiplication of real numbers using quantifiers.

For example, we can express the closure property of addition in terms of quantifiers as follows.

$$\forall x \forall y \exists z \, (x + y = z)$$

This project asks you to express other properties of addition or multiplication in terms of quantifiers.

(a) Use quantifiers to express the commutative property of addition.

(b) Use quantifiers to express the associative property of addition.

(c) Use quantifiers to express the fact that there is an additive identity for real numbers. (An additive identity is a number you can add to any other number without changing the value.)

(d) Use quantifiers to express the fact that there is an additive inverse for real numbers. (An additive inverse of a number is a number you can add to it so that the resulting sum is equal to the additive identity.)

(e) Use quantifiers to express the closure property of multiplication.

(f) Use quantifiers to express (both) distributive properties.

(g) Use quantifiers to express the commutative property of multiplication.

(h) Use quantifiers to express the associative property of multiplication.

(i) Use quantifiers to express the fact that there is a multiplicative identity.

(j) Use quantifiers to express the fact that every real number other than the additive identity has a multiplicative inverse.