

7. Define $*$ on $\mathbb{Z} \setminus \{0\}$ by $a * b = ab$. Is $(\mathbb{Z}, *)$ a group? Why or why not?

(No.) 1 is the identity element because $a * 1 = a$ for all a
 but 2 does not have an inverse because there does not
 exist an integer b with $2 * b = 1$.

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8. Let \mathbb{R}^{pos} be the set of positive real numbers. Define $*$ on \mathbb{R}^{pos} by $a * b = ab$.
 Is $(\mathbb{R}^{\text{pos}}, *)$ a group? Why or why not?

Yes closure If I multiply 2 positive real numbers, my answer
 is a positive real number

associativity of course

1 is the identity element.

inverse, If a is a positive real #, then $\frac{1}{a}$ is a
 positive real number and $\frac{1}{a} * a = 1$.

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