

# EXAMPLES & NON-EXAMPLES OF GROUPS

Structure	Bin	Ass	Id Elmt	Inv.
① $\langle \mathbb{Z}, + \rangle$	✓	✓	✓	✓
② $\langle \mathbb{Q}, + \rangle$	✓	✓	✓	✓
③ $\langle \mathbb{R}, + \rangle$	✓	✓	✓	✓
④ $\langle \mathbb{R}, - \rangle$	✓	✗	✗	✗
⑤ $\langle \mathbb{Q}, \cdot \rangle$	✓	✓	✓	✗
⑥ $\langle \mathbb{Q}^*, \cdot \rangle$	✓	✓	✓	✓
⑦ $\langle \mathbb{R}^*, \cdot \rangle$	✓	✓	✓	✓
⑧ $\langle \mathbb{Z}^*, \cdot \rangle$	✓	✓	✓	✗
⑨ $M_2(\mathbb{R})$ with matrix addition	✓	✓	✓	✓
⑩ $M_2(\mathbb{R})$ with matrix multiplication	✓	✓	✓	✗
⑪ $GL_2(\mathbb{R})$ with matrix multcp	✓	✓	✓	✓
⑫ $SL_2(\mathbb{R})$ with matrix multcp	✓	✓	✓	✓
⑬ $\mathbb{Z}_n$ (The set of int. modulo $n$ ) w.r.t $+$	✓	✓	✓	✓
⑭ $\mathbb{Z}_n$ w.r.t $\cdot$	✓	✓	✓	✗
⑮ $\mathbb{R} \times \mathbb{R}$ (Cartesian Product) w.r.t componentwise addition	✓	✓	✓	✓
⑯ $P_D$ (Power set of a set $D$ ) w.r.t <u>symmetric difference</u>	✓	✓	✓	✓