Homework 1

p24 B.5 and B.6, p29 A.1 and A.2, p39 A.1 and A.2, p40 C.3 and C.5

1. **p24 B.5.** $x * y = xy + 1$
   - **Commutative** Yes/No
   - **Associative** Yes/No
   - **Identity** Yes/No
   - **Inverses** Yes/No
2. **p24 B.6.** $x * y = \max\{x, y\}$ = the larger of the two numbers x and y
   - **Commutative** Yes/No
   - **Associative** Yes/No
   - **Identity** Yes/No
   - **Inverses** Yes/No
3. **p29 A.1.** Prove the following set is an abelian group:
   $x * y = x + y + k$ (k is a fixed constant), on the set $\mathbb{R}$ of the real numbers
   Solution. Answer
4. **p29 A.2.** Prove the following set is an abelian group:
   $x * y = \frac{xy}{2}$ on the set $\{x \in \mathbb{R} : x \neq 0\}$
   Solution. Answer
5. **p39 A.1.** Solve in terms of a, b, and c:
   $axb = c$
   Solution. Answer
6. **p39 A.2.** Solve in terms of a, b, and c:
   $x^2b = xa^{-1}c$
   Solution. Answer

7. **p40 C.3.** Assuming that a and b commute, prove the following:
   a commutes with ab
   Solution. Answer

8. **p40 C.5.** Assuming that a and b commute, prove the following:
   xax^{-1} commutes with xbx^{-1}, for any $x \in G$
   Solution. Answer