MATH 318, Assignment 4

Kyle Rubenok, 260667187

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1. 1) The atoms of B are as follows:

   $p \wedge q \wedge r$ | $p \wedge q \wedge \neg r$
   $\neg p \wedge \neg q \wedge r$ | $\neg p \wedge \neg q \wedge \neg r$
   $p \wedge \neg q \wedge r$ | $p \wedge \neg q \wedge \neg r$
   $\neg p \wedge q \wedge r$ | $\neg p \wedge q \wedge \neg r$

   2) From the 8 atoms above, we have that there are 2^8 elements in B.

2. 1) Take $B = \mathcal{P}$. Each of the atoms in B makeup the singleton set with every non-empty set in B containing a singleton. This means that for every nonzero $b \in B$, there is an atom $a \in B$ with $a \leq b$.

   2) Yes, take B as any boolean algebra without atoms. Additionally let B' be the algebra 2. From this, $B \times B'$ has exactly one atom, $(0, 1)$.

3.