List of basic properties for Boolean algebras:

AJ:	$x \sqcup (y \sqcup z) = (x \sqcup y) \sqcup z$
AM:	$x \sqcap (y \sqcap z) = (x \sqcap y) \sqcap z$
CJ:	$x \sqcup y = y \sqcup x$
CM:	$x \sqcap y = y \sqcap x$
IJ:	$x \sqcup x = x$
IM:	$x \sqcap x = x$
ABS1:	$x \sqcup (x \sqcap y) = x$
ABS2:	$x \sqcap (x \sqcup y) = x$
D1:	$x \sqcup (y \sqcap z) = (x \sqcup y) \sqcap (x \sqcup z)$
D2:	$x \sqcap (y \sqcup z) = (x \sqcap y) \sqcup (x \sqcap z)$
M1:	$\overline{x \sqcup y} = \overline{x} \sqcap \overline{y}$
M2:	$\overline{x \sqcap y} = \overline{x} \sqcup \overline{y}$
ZJ:	$x \sqcup 0 = x$
ZM:	$x \sqcap 0 = 0$
OJ:	$x \sqcup 1 = 1$
OM:	$x \sqcap 1 = x$
CPJ:	$x \sqcup \overline{x} = 1$
CPM:	$x \sqcap \overline{x} = 0$
DN:	$\overline{\overline{x}} = x$

Also sometimes included:

$$\text{NE: } 0 \neq 1.$$

Axiom system for upper semilattices:

$$\Sigma^{USL} = \{\text{AJ}, \text{CJ}, \text{IJ}\}.$$

These axioms are independent and characterize upper semilattices; we say they form a *basis* for upper semilattices.

Axiom system for lattices: The first 8 identities above (up to including the absorption laws) are the basic properties of lattices, but we can do without the idempotent axioms. Accordingly, the following axiom system is a basis for lattices:

$$\Sigma^{\text{L}} = \{\text{AJ}, \text{AM}, \text{CJ}, \text{CM}, \text{ABS1}, \text{ABS2}\}.$$

The idempotent laws can be derived in Σ^{L}:

$$x \sqcup x = x \sqcup (x \sqcap (x \sqcup x)) = x,$$

using ABS1 and ABS2. None of the remaining axioms may be omitted, even if the idempotent laws were included.

Axiom systems for distributive lattices: This time we may omit quite a lot from the above list of basic properties. In fact, each of the following forms a basis:

$$\Sigma_1^{\text{DL}} = \{\text{CJ}, \text{CM}, \text{A1}, \text{D1}\},$$
$$\Sigma_2^{\text{DL}} = \{\text{CJ}, \text{CM}, \text{A2}, \text{D2}\},$$
$$\Sigma_3^{\text{DL}} = \text{CJ}, \text{CM}, \text{IM}, \text{A1}, \text{D2}\},$$
$$\Sigma_4^{\text{DL}} = \text{CJ}, \text{CM}, \text{IJ}, \text{A2}, \text{D1}\}.$$

Every axiom system for distributive lattices which contains only axioms from the above list of basic properties must at least contain one of $\Sigma_1^{\mathrm{DL}}, \ldots, \Sigma_4^{\mathrm{DL}}$. However, we can do even without the commutative laws if the distributive laws are modified as follows:

$$\mathrm{D1}'\colon x \sqcup (y \sqcap z) = (z \sqcup x) \sqcap (y \sqcup x),$$
$$\mathrm{D2}'\colon x \sqcap (y \sqcup z) = (z \sqcap x) \sqcup (y \sqcap x).$$

Then each of the following axiom systems is also a basis for distributive lattices, as shown by Sholander (1951):

$$\Sigma_5^{\mathrm{DL}} = \{\mathrm{A1}, \mathrm{D1}'\},$$
$$\Sigma_6^{\mathrm{DL}} = \{\mathrm{A2}, \mathrm{D2}'\}.$$

Axiom systems for Boolean algebras: In addition to axioms for distributive lattices it suffices to include CPJ and CPM; for instance:

$$\Sigma_1^{\mathrm{BA}} = \{\mathrm{A1}, \mathrm{D1}', \mathrm{CPJ}, \mathrm{CPM}\},$$
$$\Sigma_2^{\mathrm{BA}} = \{\mathrm{A2}, \mathrm{D2}', \mathrm{CPJ}, \mathrm{CPM}\},$$

If we use Σ_1^{DL} or Σ_1^{DL} for distributive lattices, then one of the commutative laws may be omitted:

$$\Sigma_3^{\mathrm{BA}} = \{\mathrm{CJ}, \mathrm{A1}, \mathrm{D1}, \mathrm{CPJ}, \mathrm{CPM}\},$$
$$\Sigma_4^{\mathrm{BA}} = \{\mathrm{CM}, \mathrm{A2}, \mathrm{D2}, \mathrm{CPJ}, \mathrm{CPM}\}.$$

A different axiom system was introduced by Huntington 1933, which uses the *Huntington equation*

$$\mathrm{HE}\colon \overline{\overline{x} \sqcup \overline{y}} \sqcup \overline{\overline{x} \sqcup y} = x.$$

The following axiom system also characterizes Boolean algebras:

$$\Sigma_5^{\mathrm{BA}} = \{\mathrm{AJ}, \mathrm{CJ}, \mathrm{HE}\}.$$

Of course, Σ_5^{BA} only concerns the operations $\sqcup$ and $^-$, so Huntington's result may be stated as follows: if a model $\langle A, \sqcup, ^- \rangle$ satisfies Σ_5^{BA}, then it can be expanded to a Boolean algebra by defining $\sqcup$, 0 and 1 appropriately.
Robbins raised the question if HE may be replaced by its dual, which is called the Robbins equation:

$$\mathrm{RE}\colon \overline{\overline{x \sqcup y} \sqcup \overline{\overline{x} \sqcup \overline{y}}} = x.$$

So the Robbins conjecture was that the axiom system

$$\Sigma_6^{\mathrm{BA}} = \{\mathrm{AJ}, \mathrm{CJ}, \mathrm{RE}\}$$

also characterizes Boolean algebras. Progress was made by S. Winkler in the 1980's. Robbins conjecture was proved 1996 by the automatic theorem proves EQP.