Full name: _____

CSC336: John Connor — Midterm

The midterm is worth a total of **100 points**.

1. (25 points) List all of the super-keys of the relation $R(A, B, C, D, E)$ with keys ABD and ACE. (That is, the relation has two keys: the aggregate key ABD, and the aggregate key ACE.)

2. (25 points) What is the closure of $\{A, B\}$ with respect to $R(A, B, C, D, E, F, G)$ if R has the following functional dependencies?

   (a) $G \to CDE$ $\quad A \to F$ $\quad BF \to ABC$ $\quad FC \to G$

   (b) $D \to A$ $\quad C \to D$ $\quad A \to B$ $\quad AB \to C$

3. (25 points) For each of the following questions, if the schema $R(A, B, C, D, E)$ is in BCNF or 3NF with respect to the given the functional dependencies, draw a circle around BCNF or 3NF (or both) as appropriate. Show your work!

   (a) BCNF $\quad$ 3NF $\quad AB \to C$ $\quad A \to B$ $\quad A \to DE$ $\quad C \to D$

   (b) BCNF $\quad$ 3NF $\quad E \to BCD$ $\quad D \to AE$ $\quad B \to CD$

4. (25 points) Use the algorithm given in class to compute the 3NF for $R(A, B, C, D, E)$ with the following FDs.
   (a) $A \to BC \qquad B \to C \qquad E \to D$

   (b) $A \to BC \qquad E \to BCD \qquad B \to CD$