MATH 2ddd formalization exercises

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In each of the following exercises you are given a structure and a list of atomic formulas. Then you are given a mathematical statement which you are asked to write in the formal language given by these atomic formulas. In some cases you may be asked to put this formal statement in a special form.

Recall the logical symbols \land for and, \lor for or, \rightarrow for implies, \neg for not, \top for true, \bot for false, \forall for for all, and \exists for there exists. Below we always include atom = for equality.

- F1. We are given the domain of integers \mathbb{Z} , and our language has atoms for equality =, for less-than <, the usual polynomials with plus, minus, and times, and constants $0, 1, 2, 3, \ldots$ And a constant symbol c standing for an integer, you don't know which. Formalize the statement that c is a multiple of 10.
- F2. We are given the domain of integers \mathbb{Z} , and our language has atoms for equality =, for less-than <, the usual polynomials with plus, minus, and times, and constants $0, 1, 2, 3, \ldots$ And a constant symbol cstanding for an integer, you don't know which. Formalize the statement that c is not a multiple of 50.
- F3. We are given the domain of integers \mathbb{Z} , and our language has atoms for equality =, for less-than <, the usual polynomials with plus, minus, and times, and constants $0, 1, 2, 3, \ldots$ And a constant symbol cstanding for an integer, you don't know which. Formalize the statement that c is a multiple of 10 but not a multiple of 50.
- F4. We are given the domain of integers \mathbb{Z} , and our language has atoms for equality =, for less-than <, the usual polynomials with plus, minus, and times, and constants $0, 1, 2, 3, \ldots$ And constant symbols c, d, and e standing for integers, you don't know which ones. Formalize the statement that c is a multiple of d but not a multiple of e.