

CS200 - Midterm Review Questions

1. This is a little easier than what would be on exam, but good practice for setting up the techniques. Prove that if n is even, $n + 4$ is even, using direct proof, prove by contrapositive, proof by contradiction.
2. These are a little harder than what would be on exam, but good practice for setting up the techniques:
 - (a) Prove using a proof by cases that $\forall n \in \mathbb{Z}, n^2 \geq n$.
 - (b) Now prove using proof by contradiction and using cases that $\forall n \in \mathbb{Z}, n^2 \geq n$.
Hint: think about dividing both sides by n and $-n$.
3. Let $G(x, y)$ be the predicate, x is the grandmother of y .
 - (a) Let Y be the statement: “No one has more than two grandmothers.” Then $Y \equiv$
 - (b) Let Q be the statement “Everyone has exactly two grandmothers.” The $Q \equiv$
4. You meet a group of 50 orcs. You know orcs are either honest or corrupt. Suppose you know that at least one of the orcs is honest. You also know that given any two of the orcs, at least one is corrupt. Can you figure out how many of the orcs are corrupt and how many are honest? If G is the set of orcs, and $C(g)$ is the predicate, “orc g is corrupt,” can you express these statements (“given any two orcs, at least one is corrupt,” “given any two orcs, at least one is corrupt”) using math?
5. Who is in the common room? Either Kevin or Sebin, or both, are there. Either Alexei or Vijay, but not both, are there. If Erin is there, so is Alexei. Vijay and Kevin are both there, or neither is there. If Sebin is there, so are Erin and Kevin.