

MATH 2610
Discrete Mathematics for Computer Science
Tuesday January, 18 2005

- (1) Read the addendum for today which can be found on the course website. Or at least be aware that it is there so that you can use it as a reference. You may find it is helpful when trying to write up some proofs. If any of the wording is confusing, please send me an email so I will know where to be more explicit and/or less sesquipedalian (truly a great word!).
- (2) To prove a statement of the form $p \leftrightarrow q$ (read “ p if and only if q ”) one needs to show both $p \rightarrow q$ and $q \rightarrow p$. Let $n \in \mathbb{Z}$. Prove n is odd if and only if n^2 is odd.
- (3) For each of these arguments determine whether the argument is correct or incorrect and explain why.
 - (a) All cats in my house know how to nap. Yoda is a cat in my house. Therefore, Yoda knows how to nap.
 - (b) Every jedi initiate (called a **padawan**) learns how to levitate rocks. Darth Maul can levitate rocks. Therefore, Darth Maul is a padawan.
 - (c) All sith wear black. Luke Skywalker is not a sith. Therefore, Luke Skywalker does not wear black.
 - (d) Everyone that lives on Tatooine has a fierce tan. Count Dooku has a fierce tan. Therefore, Count Dooku lives on Tatooine.
 - (e) Everyone that survives a point blank gun battle shoots first. Han Solo survived a point blank gun battle with the bounty hunter Guido. Therefore, HAN SHOOTS FIRST.
- (4) Determine whether these are valid arguments.
 - (a) “If x^2 is irrational, then x is irrational. Therefore, if x is irrational, it follows that x^2 is irrational.”
 - (b) “If x^2 is irrational, then x is irrational. The number $x = \pi^2$ is irrational. Therefore, the number $x = \pi$ is irrational.”
- (5) Prove that the square of an even number is an even number using
 - (a) a direct proof.
 - (b) an indirect proof.
 - (c) a proof by contradiction.
- (6) Prove that if n is an integer and $n^2 + 5$ is odd, then n is even using
 - (a) an indirect proof.
 - (b) a proof by contradiction.
- (7) Prove that the product of two rational numbers is rational.
- (8) Prove or disprove that the product of two irrational numbers is irrational.
- (9) Prove or disprove that the product of a nonzero rational number and an irrational number is irrational.