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Professor Engling

CS135

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*I pledge my honor that I have abided by the Stevens Honor System.*

Homework 3

1.6

* 1. Simplification.
  2. Disjunctive Syllogism
  3. Modus Ponens
  4. Addition.
  5. Hypothetical Syllogism

1.7

* 1. Let one odd number be 2k + 1, and let another be 2j + 1. Multiplying them together, we get (2k+1)\*(2j+1) = (4jk + 2k + 2j + 1). This can be rewritten as 2(2jk + j + k) + 1, which is the form of an odd number. Therefore, the product of two odd numbers is always odd.
  2. Start by assuming the opposite; n is odd. Plugging in an odd number 2k + 1 to (3n + 2) gives us (6k + 3 + 2). That can be rewritten as (6k + 4 + 1) or (2(3k + 2) + 1), which is the form of an odd number. Because we proved 3n + 2 Is odd when n is an odd number, we have proven that 3n + 2 is even when n is an even number by contraposition.

1.8

1. In the case where x >= y, max will be x, and min will be y (or x if they are equal, making it irrelevant which is picked). Adding x and y obviously equals x + y, or x + x = x + y if x = y. In the case where x < y, max(x, y) will be y, and min(x, y) will be x. y + x = x + y by the transitive property of addition. Because min(x, y) + max(x, y) will equal x + y in all cases, it must be true.
2. √0 = 0, 3√(0 + 1) = 1. 0 and 1 are consecutive integers, therefore there exist a pair of consecutive integers such that one of these integers is a perfect square and the other is a perfect cube. (8 and 9 also work.)

2.1

* 1. {-1, 1}
  2. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11} ;assuming 0 is a positive integer
  3. {0, 1, 4, 9, 16, 25, 36, 49, 64, 81}
  4. {} empty list; no integer squared = 2.
  5. {x | x is a multiple of 3 and x < 15}
  6. {x | x is an integer whose absolute value is less than 4}

1. B ⊂ A, C ⊂ A, C ⊂ D
   1. {(empty), a}
   2. {(empty), a, b, (a, b)}
   3. {(a , y), (a , z), (b, y), (b, z), (c, y), (c, z), (d, y), (d, z)}

2.2

* 1. {0, 1, 2, 3, 4, 5, 6}
  2. {3}
  3. {1, 2, 4, 5}
  4. {0, 6}