1. Fallacy, the store could be closed another day.
2. Argument by contraposition: D(x) = x is a dog

E(x) = x eats meat

D(x) E(x)

f = Fluffy

E(f) D(f)

1. 1. p q (premise)
   2. p u (premise)
   3. q (premise)
   4. ((r t) p) u (premise)
   5. p (Modus Tollens) (i), (iii)
   6. u (Disjunctive Syllogism) (ii), (v)
   7. ((r t) p) (Disjunctive Syllogism) (iv), (vi)
   8. r t (Disjunctive Syllogism) (v), (vii)
   9. r t (Conclusion)
2. Ramses = r

Sylvester = s

* 1. L(x) A(x) H(x, y) (premise)
  2. L(r) (premise)
  3. H(r, s) (premise)
  4. H(r, s) (L(r) (A(s)) (Modus Tollens) (i), (ii), (iii)
  5. L(r) A(s) (De Morgan) (iv)
  6. A(s) (Disjunctive Syllogism) (ii), (v)

1. Let a be an even number, and b be an odd number. By definition, a = 2x and b = (2y + 1) for some integers x and y. Now ab = (2x)(2y + 1) = 4xy + 2x = 2(2xy + x). Next, let k = 2xy + x. Finally, ab = 2k by definition is even.
2. To prove by contraposition, we must prove that if is rational then so is x. By definition of rational, if is rational, then it is equivalent to some , where a and b are nonzero integers. = is equivalent to x = which is a rational number. Therefore, when x is irrational, so is .
3. Setting n = 16 proves existence of a positive integer that satisfies 2n + 1 33
4. The question can be simplified to find k by comparing the denominator values. The larger the denominator, the smaller the value of the fraction, so we rewrite the comparison to:   
   n+2 k + 1. There are then two cases to consider:
   1. If n is even: select k = n so that k is also even. By plugging in n into k, it can be concluded that, n+2 k + 1 = n + 2 n + 1 is true for all integers n.
   2. If n is odd: select k = n + 1, so that k is even. By plugging n + 1 into k, it can be conclude that, n+2 k + 1 = n + 2 n + 2 is true for all positive integers n.
5. *Extra credit:*

