Michael Chillemi Foundations of Computer Science Assignment 1

1.5

12.

a) I(Jerry)

b) C(Rachel,Chelsea)

c)C(x,Sharon)

d)C(x,Bob)

e) )C(Joseph,Sanjay)

f)

g)

h)

i))

j) )

k) C(x,y))

l) C(x,y))

m)(x,y))

n)

o)

14.

a) C(x): x is a student in the class, H(x): x speaks Hindi

b) C(x): x is a student in the class, P(x): x plays some sport

c) C(x): x is a student in the class, V(x): x has visited Alaska, H(x): x has visited Hawaii

d) C(x): x is a student in the class, L(x): x has learned at least one programming language

e) C(x): x is a student in the class, D(x): x has taken every course offered by one of the departments in this school

f) C(x): x is a student in the class, G(x): x grew up in a town

g) C(x): x is a student in the class, A(x): x chatted with at least one student, E(x) x chatted in at least one group

18.

a) A(x,y) = console x is accessible during fault condition y

b) B(x,y) = email address of user x has sent message y on the system. C(x) = email address of user x can be retrieved

c) D(x,y) = mechanism x can detect security breach y, E(z) = process z has been compromised

d) F(x,y,z) = path x connects distinct end points y and z

e) G(x,y) = x knows password of user y, H(x) = x is a system administrator

24.

a) There exists a real number x such that for every real number y, the sum of x and y equals to y.

b) For every real number x and real number y, if x is not negative and y is negative, then the difference x-y is positive.

c) There exists real number x and real number y such that x is not positive and y is not positive and the difference x-y is positive.

d)For every real number x and real number y, x is not equal to 0 and y is not equal to 0 if and only if the product of is x and y is not equal to 0.

26.

a) 1+1 = 1-1, 2 Truth Value = FALSE

b) 2+0 = 2 – 0, 2=2 Truth Value = TRUE

c) 1+y = 1 – y, 2y = 0, y =0 the statement will only be true if y=0, Truth Value = FALSE

d) x+2 = x – 2, cancel out x you get 2 = -2, move over the -2, 4=0, Truth Value = FALSE

e) x+y = x – y, cancel out x, y = -y, move over y, 2y=0, y=0 Q(x,0) is true, Truth Value = TRUE

f) x+y = x – y, cancel out x, y = -y, move over y, 2y=0, y=0 Truth Value = TRUE

g) x+y = x – y, cancel out x, y = -y, move over y, 2y=0, y=0 Truth Value = TRUE

h) x+y = x – y, cancel out x, y = -y, move over y, 2y=0, y=0,For all y is not true Truth Value = FALSE

i) x = 1, y =2, x +y = 3, x-y = -2, Q(1,2) is not true Truth Value = FALSE

1.6

2. let p be “George does not have eight legs”, let q be “George is not an insect”,

\_\_\_\_\_\_\_\_\_\_

The argument is a valid argument by Modus Tollens the conclusion is true if the premises are true

4.

a) P: Kangaroos live in Australia, Q: kangaroos are marsupials

\_\_\_\_\_\_

Simplification is used in this argument.

b) p: it is hotter than 100 degrees today, q: the pollution is dangerous

\_\_\_\_\_\_

Disjunctive syllogism is used in this argument.

c) p: Linda is an excellent swimmer, q: Linda can work as a lifeguard

\_\_\_\_\_\_

Modus ponens is used in this argument.

d) p: Steve will work at the computer company this summer, q: he will be a beach bum

\_\_\_\_\_\_

Addition is used in this argument.

e) p: I work all night on this homework , q: I can answer all the exercises, r: I will understand the material

\_\_\_\_\_\_

Hypothetical syllogism is used in this argument.

6. r = “it rains”, f = “it is foggy”, s = “the sailing race will be held”, l = “The lifesaving demonstration will go on”, t = “the trophy will be awarded”

, ,

Premises:

|  |  |
| --- | --- |
| Step | Reason |
|  | From the hypothesis |
|  | From the hypothesis |
|  | Modus tollens using |
|  | From the hypothesis |
|  | It is the Contrapositive of |
|  | You use De Morgan’s law and the Double negative rule |
|  | You use addition using |
|  | Using Modus ponens and |
|  | Using simplification using |

14.

a) c(x) = x is in this class, r(x) = x owns a red convertible, t(x) = x has been gotten speeding tickets.

Premises: c(Linda), r(Linda),

Conclusion:

|  |  |
| --- | --- |
| Steps | Reason |
|  | Using Hypothesis |
|  | Using Universal instantiation using number 1 |
|  | Using Hypothesis |
|  | Using Modus ponens using number 2 and number 3 |
|  | Using Hypothesis |
|  | Using Conjunction using number 4 and number 5 |
|  | Using Existential generalization using number 6 |

b) r(x) = x is one of the roommates listed, d(x) = x has taken a course in discrete mathematics, a(x)= x can take a course in algorithms

Premises: and

Conclusion:

|  |  |
| --- | --- |
| Steps | Reason |
|  | Using Hypothesis |
|  | Using Universal instantiation using number 1 |
|  | Using Hypothesis |
|  | Using Universal instantiation using number 3 |
|  | Hypothetical syllogism |
|  | Using universal generalization using number 5 |

c) s(x) = x is a movie produced by Sayles, c(x)= x is a movie about coal miners, w(x) = movie x is wonderful

Premises: and

Conclusion:

|  |  |
| --- | --- |
| Steps | Reason |
|  | Using Hypothesis |
|  | Using Existential instantiation using number 1 |
|  | Using simplification using Number 2 |
|  | Using Hypothesis |
|  | Using Universal instantiation using number 4 |
|  | Using Modus ponens using number 3 and number 5 |
|  | Using simplification using Number 2 |
|  | Using Conjunction using number 6 and number 7 |
|  | Using Existential generalization using number 8 |

d) c(x) = x is in this class, f(x) = x has been to France, l(x) = x has visited the Louvre

Premises: ,

Conclusion:

|  |  |
| --- | --- |
| Steps | Reasons |
|  | Using Hypothesis |
|  | Using Existential instantiation using number 1 |
|  | Using simplification using Number 2 |
|  | Using simplification using Number 2 |
|  | Using Hypothesis |
|  | Using Universal instantiation using number 5 |
|  | Using Modus ponens using number 3 and number 6 |
|  | Using Conjunction using number 4 and number 7 |
|  | Using Existential generalization using number 8 |

16.

a) e(x) = x has enrolled in the university, d(x) = x has lived in a dormitory

Hence the argument is valid.

b) c(x) = x is convertible, d(x) = it is fun to drive

Hence the argument is invalid.

c) L(x,y) = x likes y

You cannot apply any inference rule

Hence the argument is invalid

d) L(x) = x is a lobsterman, S(x) = x is a set at least a dozen traps

Hence the argument is valid