**Discrete Structures - Homework 1.2**

**Warm up problmes:**

a)   Look up the word "logic" in a dictionary.   Write the meaning that seems to best fit the meaning in this course.  
  
b)   All definitions are important! Make sure you can reproduce the truth tables for "p and q" and "p or q".  
  
c)   To say that two propositional forms are logically equivalent means that \_\_\_\_\_\_\_\_\_\_\_\_.  
  
d)   Write the definition of a proposition and a propositional function.

**Homework:   
Determine if the following is a proposition, propositional functions or neither.  
If the statement is a proposition then   
    a)   determine its truth value.  
    b)   Write the negation of the proposition and determine the truth value of the negation.  
  
If the statement is a propositional function then state a domain.**

1.Sam asked to be excused from the table this morning.

2.Cindy got her hair cut last Friday.

3.1 + 1 = 3

4.10n = 60

5.x2 https://my.westcottcourses.com/images/common/elementof.gif https://my.westcottcourses.com/images/common/natural.gif

6.4 > 8

7.Today is Presidents' day.

8.Don't track mud into the house.

9.3 > 1   or   -5 < -2

10.4 < 6 < 9

11.-2 < 0 < 4

12.1 < 7   and   7 < 9

**Determine if the following is a proposition, propositional functions or neither. If it is a proposition, determine the truth value.**

13.for some integer n, 10n = 60

14.for all   x https://my.westcottcourses.com/images/common/elementof.gif https://my.westcottcourses.com/images/common/natural.gif   x2 https://my.westcottcourses.com/images/common/elementof.gif https://my.westcottcourses.com/images/common/natural.gif

15.for every x https://my.westcottcourses.com/images/common/elementof.gif https://my.westcottcourses.com/images/common/real.gif, x2 < x2

16.there exists y https://my.westcottcourses.com/images/common/elementof.gif Z, such that y2 < -1

17.71x = 76

18.there exists x https://my.westcottcourses.com/images/common/elementof.gif https://my.westcottcourses.com/images/common/natural.gif, such that x = 1

19.for all x https://my.westcottcourses.com/images/common/elementof.gif https://my.westcottcourses.com/images/common/natural.gif, such that x = 1

20.for some x https://my.westcottcourses.com/images/common/elementof.gif https://my.westcottcourses.com/images/common/real.gif, x3 < x2

21.for every y https://my.westcottcourses.com/images/common/elementof.gif Z, such that y2 < -1

22.there exists x https://my.westcottcourses.com/images/common/elementof.gif https://my.westcottcourses.com/images/common/real.gif, such that x = 105

**Determine if the statement is a propositional function. If so, state a domain.**

23.n2 is greater than 10

24.Clean up your room.

25.Let n be a natural number.

26.The student won the presidential election at Clairmont High.

27.10 - 5 = 5

28.10n - 5 = 5

29.The song was on the top 10 chart in January 2015.

30.(x3 - 3x) https://my.westcottcourses.com/images/common/elementof.gif https://my.westcottcourses.com/images/common/real.gif

31.15 is a real number

**Let P(n) be the propositional function "n divides 55. Write each proposition in words and tell whether it is true or false. The domain is the set of all positive integers. The statement "n divides 55" means that n goes into 55 evenly.**

32.P(5)

33.P(11)

34.P(10)

35.for some n, P(n)

36.for every n, P(n)

**Given the following, determine whether the following propositions are true or false.**

p = T, q = T, r = F

37.p https://my.westcottcourses.com/images/common/and.gif r

38.p https://my.westcottcourses.com/images/common/or.gif q

39.p https://my.westcottcourses.com/images/common/and.gif

40. https://my.westcottcourses.com/images/common/and.gif r

41.https://my.westcottcourses.com/images/homework/discrete/1.1.41.gif https://my.westcottcourses.com/images/common/and.gif (q https://my.westcottcourses.com/images/common/and.gif )

42.https://my.westcottcourses.com/images/homework/discrete/1.1.42.gif https://my.westcottcourses.com/images/common/and.gif q

**Write the truth table for each of the following propositions.**

43.https://my.westcottcourses.com/images/homework/discrete/1.1.43.gif

44.(p https://my.westcottcourses.com/images/common/or.gif ) https://my.westcottcourses.com/images/common/and.gif p

45.https://my.westcottcourses.com/images/homework/discrete/1.1.45.gif https://my.westcottcourses.com/images/common/or.gif ( https://my.westcottcourses.com/images/common/and.gif q)

46.((p https://my.westcottcourses.com/images/common/and.gif ) https://my.westcottcourses.com/images/common/or.gif (q https://my.westcottcourses.com/images/common/and.gif )) https://my.westcottcourses.com/images/common/and.gif

47.https://my.westcottcourses.com/images/homework/discrete/1.1.47.gif

48.q https://my.westcottcourses.com/images/common/and.gif ( https://my.westcottcourses.com/images/common/and.gif q) https://my.westcottcourses.com/images/common/and.gif (p https://my.westcottcourses.com/images/common/or.gif ) https://my.westcottcourses.com/images/common/and.gif p

**Determine the truth value of the following statements.**

49.6 > 8   or   6 < 7

50.5 = 6   and   6 > 10

51.It is not the case that (5 = 6 and 6 > 10).

52.6 > 8   or   5 > 7

**Translate the following symbolic expressions into words:**

a = Harry goes to the gym on Thursdays.  
b = Harry watched a movie last night.

53.

54.a https://my.westcottcourses.com/images/common/or.gif b

55.a https://my.westcottcourses.com/images/common/and.gif b

56.a https://my.westcottcourses.com/images/common/or.gif

57.https://my.westcottcourses.com/images/homework/discrete/1.1.57.gif

58. https://my.westcottcourses.com/images/common/and.gif b

**Translate the symbolic expressions into words.**

p = It is cloudy.  
q = It is cold.  
r = It is warm.

59.p https://my.westcottcourses.com/images/common/and.gif q

60. https://my.westcottcourses.com/images/common/or.gif ( p https://my.westcottcourses.com/images/common/and.gif q )

61.https://my.westcottcourses.com/images/homework/discrete/pvq.gif https://my.westcottcourses.com/images/common/or.gif r

**Translate each phrase into a symbolic expression.**

a = It is cold.  
b = It is raining.  
c = The sun is out.

62.It is raining, and it is cold.

63.It is cold, and it is not raining.

64.It is not raining, and it is not the case that (it is cold or that the sun is out).

65.It is not the case that (it is raining or it is cold), and the sun is out.

66.Either it is raining or it is cold.

**Determine the following:**

67.Susie is going to move into an apartment complex that does not allow pets other than what is allowed by its pet rule. The rule is "A tenant may not own more than one dog and one cat." If the tenant owns two cats and no dogs, is the tenant violating the rule?

[**Answers**](https://my.westcottcourses.com/scripts/contentServer.php3?type=homework&chapSec=1.2&course=Discrete+Structures#1)

**Homework Solutions**

1.Proposition.  
Sam either did or did not ask to be excused from the table this morning, so this statement does have a truth value and is a proposition.   
Negation: Sam did not ask to be excused from the table this morning.

3.1 + 1 = 3 is a false statement, thus it is a proposition.  
Negation: 1 + 1 https://my.westcottcourses.com/images/common/notequal.gif 3

5.Propositional function. D = https://my.westcottcourses.com/images/common/natural.gif The domain is not unique.

7.Proposition.   
Negation: Today is not Presidents' day.

9.Proposition. 3 < 1   and   -5 > -2

11.Proposition. -2 < 0 < 4   
-2 < 0   and   0 < 4  
Negation: -2 > 0   or   0 > 4

13.Proposition. True for n = 6.

15.Propositional function.

17.Proposition. False for x = 0.

19.Proposition. False for x = 2.

21.Proposition. False for y = 0.

23.Propositional function. D = https://my.westcottcourses.com/images/common/integer.gif   The domain is not unique.

25.Not a p.f. It is a command.

27.Proposition.

29.Propositional function. D = All songs ever written. The domain is not unique.

31.Not a p.f. It is a proposition.

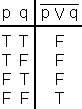
33.Since 11 goes into 55 evenly, P(11) is true.

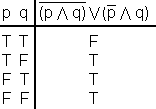
35.For the "for some" to be true, just one P(n) must be true. Since P(11) is is true, for some n, P(n) is true.

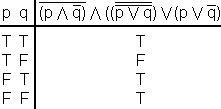
37.False

39.False

41.True

43.

45.

47.

49.True

51.True

53.Harry did not watch a movie last night.

55.Harry goes to the gym on Thursdays and Harry watched a movie last night.

57.Harry does not go to the gym on Thursdays, or Harry did not watch a movie last night.

59.It is cloudy and it is cold.

61.It is not cloudy and cold, or it is warm.

63.A https://my.westcottcourses.com/images/common/and.gif

65.https://my.westcottcourses.com/images/homework/discrete/1.1.65.gif https://my.westcottcourses.com/images/common/and.gif c

67.The maximum limit a tenant can have is one dog AND one cat. This is the maximum.  
A tenant must hit the maximum of one dog AND one cat before he/she can go over the maximum. A tenant that owns two dogs has not hit the maximum allowed, so he/she is not in violation of the rule. The landlord should have stated one dog OR one cat.

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