

Grade 7/8 Math Circles

October 28, 2020

Propositions and Control Flow - Problem Set

- Find the truth valuation for each of the given propositions if P is false, Q is true, and R is true.
 - $(P \wedge Q) \vee (\neg R)$
 - $(Q \wedge (\neg P)) \wedge (R \wedge P)$
 - $P \vee (R \wedge Q)$
 - $(P \wedge (Q \vee (R \wedge (\neg P)))) \vee (Q \wedge (P \vee R))$
- Find a proposition that is only true when either P and Q are both true or P is not true and R is true.
- Find a proposition with P and Q that always has a true truth value (no matter the truth valuation).
- Find a proposition with P and Q that always has a false truth value.
- Draw the truth tables for the following propositions.
 - $(P \wedge Q) \wedge (\neg P)$
 - $P \wedge (Q \vee (R \vee (\neg Q)))$
 - $(P \wedge R) \vee (Q \wedge \neg(Q \wedge P))$
 - $((P \vee Q) \vee (R \wedge (\neg P))) \vee (\neg Q)$
- Write a boolean expression that can be used to determine if both x is less than 5 and y is 6.
- Write a program that will print True if x is between or equal to y and z and x is not a multiple of 5. Assume that y is smaller than z .
- Write a program that will print all the numbers between, but not equal to, y and z that are not multiples of 2, but are multiples of 3. Assume you do not know which of y and z are smaller.
- Write a program that, given three numbers, a , b and c , finds the smallest, greatest and middle number. Assume none of the numbers are equal.
- Write a program that does something interesting. This could be helping to solve a math problem, a short game or anything you want to code. Share your code on Piazza!