# Homework 6 Boolean Algebra Answers

1. Simplify the following Boolean expressions.

 (a) [1]

 A (since B + 1 = B)

 (b) [1]

 (applying de Morgan’s 2nd law)

 (c) (AAB + ABB) [1]

 AB + AB = AB (Since X X = X and X + X = X)

2. Simplify the following Boolean expressions, explaining each step.

 (a) [3]

 de Morgan’s first law

 = Associative rule

 =

 = 1 + X = 1

 (b) AB + A (B+C) + B (B + C) [4]

 = AB + AB + AC + BB + BC Distributive rule

 = AB + AC + BB + BC AB + AB = AB

 = AB + AC + B + BC BB = B

 = AB + AC + B (1 + C) Distributive rule

 = AB + AC + B 1 + C = 1

 = B (1 + A) + AC Distributive rule

 = B + AC 1 + A = 1

3. (a) Write expressions for P, Q, R and S and T represented in the following logic circuit. [5]



 P = A + B (accept A OR B)

 Q = BC (Accept B AND C, or B . C)

 R = B + C (Accept B OR C)

 S = BC (B + C) (Accept (B AND C) AND (B OR C)

 T = (A + B) + BC (B + C)

 (b) Simplify the expression T. [5]

 T = (A + B) + BC(B + C)

 = A + B + BBC + BCC

 = A + B + BC + BC BB = B, CC = C

 = A + B + BC BC + BC = BC

 = A + B(1 + C) Distributive rule

 = A + B 1 + C = 1

 [Total 20 marks]