**Problem 13 [10 Points]:** Consider a cyclic redundancy check (CRC) code with 5-bit generator $G = 10101$. Suppose that data bits $D = 1111000101$. What is the value of CRC bits $R$?

K-1 = 4

10101 √ 11110001010000 Mod 2 div

result = 1011100 b

remainder = 1010

**Problem 14 [15 Points]:** Consider three nodes, $A$, $B$, and $C$ that use slotted ALOHA protocol to contend for a channel. Suppose that node $A$'s retransmission probability is $2p$ and that $B$ and $C$ both have a retransmission probability $p$, where $0 < p < 0.5$. Prove that node $A$'s average throughput measured by the probability of successful transmission is higher than the sum of nodes B and C's average throughput.

Prob. of avg throughput of A : $P_A(1-P)(1-P) = 2P(1-P)^2$

Prob Node B = $P_B(1-P_A)(1-P_C) = P(1-2P)(1-P)$

Prob Node C = $P_C(1-P_A)(1-P_B) = P(1-2P)(1-P)$

$2P(1-P)^2 > 2P(1-2P)(1-P)$