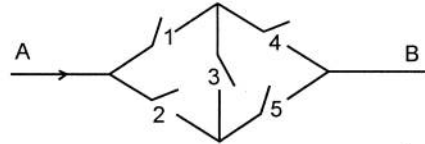


ECEn 370
Quiz #3
September 21, 2012

Name: Solution

1. (40 pts) The probability of closing the i^{th} relay in the circuit shown is p_i , $i = 1, 2, 3, 4, 5$. If all of the relays function independently, what is the probability that a current flows from A to B?



$$P(A \rightarrow B) = P(\{1 \rightarrow 4\} \cup \{1 \rightarrow 3 \rightarrow 5\} \cup \{2 \rightarrow 3 \rightarrow 4\} \cup \{2 \rightarrow 5\})$$

$$= 1 - (1 - P\{1 \rightarrow 4\})(1 - P\{1 \rightarrow 3 \rightarrow 5\})(1 - P\{2 \rightarrow 3 \rightarrow 4\})(1 - P\{2 \rightarrow 5\})$$

$$= 1 - (1 - p_1 p_4)(1 - p_1 p_3 p_5)(1 - p_2 p_3 p_4)(1 - p_2 p_5)$$

2. (30 pts) Out of 5 Electrical Engineers and 7 Computer Engineers, a design team consisting of 2 EEs and 3 CpEs is to be formed. In how many ways can this be done if any EE and any CpE can be included?

$$\binom{5}{2} \cdot \binom{7}{3} = 10 \cdot 35 = 350$$

of ways of choosing EEs # of ways of choosing CpEs

3. (30 pts) Suppose that two of the CpEs have exceptional skills and that at least one of them must be on the team. How many ways can the team be formed?

$$\binom{5}{2} \cdot \binom{2}{1} \cdot \binom{6}{2} = 10 \cdot 2 \cdot 15 = 300$$

of ways of choosing EE # of ways of selecting exceptional CpE # of ways of selecting additional CpE's