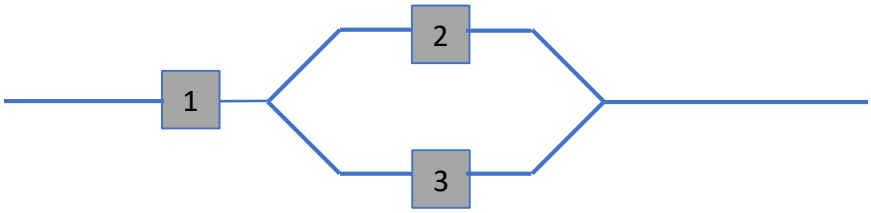
CEE 110

Discussion Week 3

3. Three components are connected to form a system as shown in the accompanying diagram. Because the components in the 2-3 subsystem are connected in parallel, that subsystem will function if at least one of the two individual components functions. For the entire system to function, component 1 must function and so must the 2-3 subsystem.



The experiment consists of determining the condition of each component [*S* (success) for a functioning component and *F* (failure) for a nonfunctioning component].

a. Which outcomes are contained in the event A that exactly two out of the three components function?
b. Which outcomes are contained in the event B that at least two of the components function?
c. Which outcomes are contained in the event C that the system functions?
d. List outcomes in C', A $\cup$ C, A $\cap$ C, B $\cup$ C, and B $\cap$ C.

5. A family consisting of three persons – A, B, and C – goes to a medical clinic that always has a doctor at each stations 1, 2, and 3. During a certain week, each member of the family visits the clinic once and is assigned at random to a station. The experiment consists of recording the station number for each member. One outcome is (1, 2, 1) for A to station 1. B to station 2, and C to Station 1.

a. List the 27 outcomes in the sample space.
b. List all outcomes in the event that all three members go to the same station.
c. List all outcomes in the event that all members go to different station.
d. List all outcomes in the event that no one goes to station 2.

19. Human visual inspection of solder joints on printed circuit boards can be very subjective. Part of the problem stems from the numerous types of solder defects (e.g., pad non-wetting, knee visibility, voids) and even the degree to which a joint possesses one or more of these defects. Consequently, even highly trained inspectors can disagree on the disposition of a particular joint. In one batch of 10,000 joints, inspector A found 724 that were judged defective, inspector B found 751 such joints, and 1159 of the joints were judged defective by at least one of the inspector. Suppose that one of the 10,000 joints is randomly selected.

a. What is the probability that the selected joint was judged to be defective by neither of the two inspectors?
b. What is the probability that the selected joint was judged to be defective by inspector B but not by inspector A?

25. The three most popular options on a certain type of new car are a built-in GPS (A), a sunroof (B), and an automatic transmission (C). If 40% of all purchasers request A, 55% request B, 70% request C, 63% request A or B, 77% request A or C, 80% request B or C, and 85% request A or B or C, determine the probabilities of the following events. [*Hints*: "A or B" is the event that at least one of the two options is requested; try drawing a Venn diagram and labeling all regions.]

a. The next purchaser will request at least one of the three options.
b. The next purchaser will select none of the three options.
c. The next purchaser will request only an automatic transmission and not either of the other two options.
d. The next purchaser will select exactly one of these three options.