

Department of Electrical and Computer Engineering
University of Massachusetts Dartmouth

ECE544 Fault-Tolerant Computing
& Reliability Engineering

Fall 2022

Homework #6

Name: _____

Instructor: Prof. Liudong Xing

ECE544: Fault-Tolerant Computing & Reliability Engineering
(Fall 2022)
Homework #6

Assigned: **October 31, Monday**

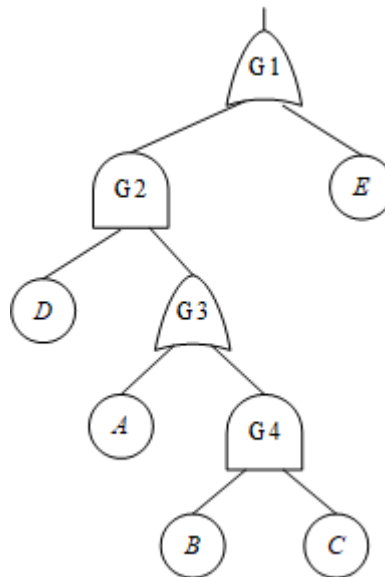
Due: **November 7, Monday, 3:30pm**

Instructions:

1. Please type your answers or write your answers clearly (illegible writing will NOT be graded).
2. Show all steps of your solution. Answers without justification would subject to a big penalty.
1. Please organize all pages of your answers into one file, name your file using “**HW6-your last name.pdf or doc**” (e.g., HW6-Xing.pdf), and submit it to lxing@umassd.edu electronically or submit a hard copy by the due date.
3. **Relevant lectures: Lecture #12, Lecture#13**

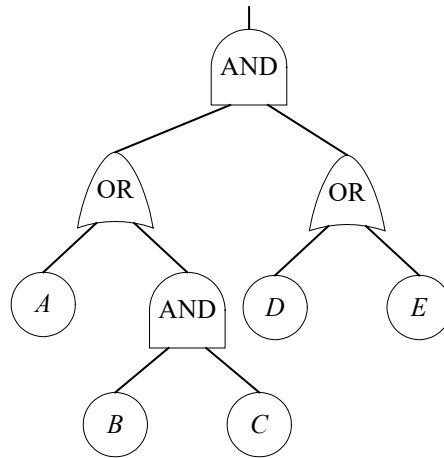
Problems:

1. Consider the following fault tree model for a system with five components A, B, C, D, and E. Gates G1 and G3 are OR gates; gates G2 and G4 are AND gates.



- a. Generate the binary decision diagram (BDD) for the fault tree using ordering $E < D < C < B < A$.
 - b. Assume the **failure probability** for each component is 0.1. Find the system reliability at time $t=10$ hours.
 - c. Assume the **failure rate** for each component is 0.1/hour. Find the system reliability at time $t=10$ hours.
2. Consider the following system fault tree model. Assume the failure probability for each component is:

Component	A	B	C	D	E
Failure probability	0.2	0.2	0.1	0.3	0.3



- Find the system reliability at time $t=1000$ hours using **the BDD method**.
- Rank the importance of the five components using the Birnbaum's measure
- Find the importance value of component B using the diagnostic importance factor (DIF)