MAE/CEE 5060 Homework Assignment #5
(60 Points)
Due 6:30PM, Wednesday, Mar 12, 2021
Please follow HW Guidelines 😊

Use composite material properties listed on pages 105/225 of the notes

(IMPORTANT)
- <u>DO NOT</u> hand in any printed output from your CLT code that will lead <u>NO</u> credits.
- Turn in a summary page showing each successive lay-up, the number of the ply that "failed," the corresponding *R*-value, and critical values of stress resultants.

1) A 8-ply AS/3501 laminate has the lay-up sequence $[0/45/90/-45]_s$ and a ply thickness, $t_p = 0.005$ in. Use your CLT code to perform assume $N_{xx} = 100$ lb/in, $M_{xy} = -10$ in-lb/in, $N_{yy} = N_{xy} = M_{xx} = M_{yy} = 0$. (30 pts)

    a. (10 pts) Determine the strength ratio, *R*, for *first-ply failure* according to the <u>*Maximum Stress Failure Criterion*</u>.
    b. (10 pts) Determine the strength ratio, *R*, for *first-ply failure* according to the <u>*Tsai-Wu Failure Criterion.*</u>
    c. (5 pts) Using the results from part a) and b) show the critical N_{xx} and M_{xy} values from *first-ply failure*.
    d. (5 pts) Please comment on your results.

2) A 16-ply T300/5208 laminate has a stacking sequence of $[0/30/60/90/-60/-30]_s$ and a ply thickness of $t_p = 0.005$ in. Use your CLT code to perform assuming $N_{xx} = 1000$, $M_{yy} = 5$, $N_{yy} = N_{xy} = M_{xy} = M_{xx} = 0$. (30 pts)

    a. (10 pts) Determine the strength ratio, *R*, for *first-ply failure* and *total laminate failure* according to the <u>*Maximum Stress Failure Criterion*</u>.
    b. (10 pts) Determine the strength ratio, *R*, for *first-ply failure* and *total laminate failure* according to the <u>*Tsai-Wu Failure Criterion.*</u>
    c. (5 pts) Using the results from part a) and b) show the evolution of the critical N_{xx} and M_{xy} values from *first-ply failure* to *total laminate failure*.
    d. (5 pts) Please comment on your results.