RECOMMENDED SUBMISSION: BY 4/30/21 MIDNIGHT CENTRAL
LAST DATE FOR SUBMISSION: BY 5/14/21 MIDNIGHT CENTRAL

DO NOT WAIT TILL LAST MINUTE TO PREPARE YOUR RESPONSE
I WILL GRADE AND RETURN INDIVIDUAL SUBMISSIONS AS THEY COME IN

ASSIGNMENT 3 GUIDELINES

- Your response must be formulated and written individually without discussion with anyone else.
- You can refer to any material but are not allowed to discuss with anyone, including but not limited to your classmates.
- Searching for relevant material on the internet is not recommended for this assignment, but is allowed.
- Please cite any external sources used in your response and identify any parts directly taken from such a source as a quotation.

- Discussion and mention of irrelevant issues will be penalized.
- Use of incorrect and sloppy English will be penalized.
- Poor presentation will be penalized.
- Response must be typed. Hand drawn figures are acceptable if appropriate but must be incorporated in pdf.

- Your response is due by the final date of May 14, 2021
- It is strongly recommended that you submit by the suggested date of April 30, 2021
- However, there is no penalty or extra credit as long as you submit by May 14, 2021

- Submit your response for Assignment 3 as a pdf file named <your last name>3.pdf
- Submit your response in an email according to the following template.
    o **To**: ravi.sandhu@utsa.edu
    o **Subject**: 6393 assignment 1 OR **Subject**: 4483 assignment 1
    o **Email body**: *Please include the following honor code statement*
      As per the UTSA honor code I attest that I have not taken any help from anyone, including but not limited to my classmates, in formulating and writing this response. Also, I have not given any help to anyone else in writing their response to this assignment. Finally, I attest I have cited all sources used in my response and identified as quotations any material taken directly from such sources.
    o **Email attachment**: *Include a pdf file named* <your last name>3.pdf

- All questions have a "correct" answer. References are not relevant.
- Guidance for length of your response is provided along with each question.
- The questions have equal weightage.

1. Consider the following RBAC system:
    - There are 3 sessions (subjects) A, B, C
    - There are 2 files (objects) F, G
    - There are 2 roles R1, R2 with no hierarchy between R1 and R2
    - Session A has role R1 active, session B has role R2 active, and session C has roles R1 and R2 active
    - Role R1 has the single permission (F,r), and role R2 has the single permission (G,r)

    Construct an access matrix to show the resulting rights for each session for each file.
    Guidance: No explanation is required. Take whatever space is required to show the solution.

2. Repeat question 1 but with role R1 senior to role R2 (so R1 has all the permissions of R2 in addition to permissions directly assigned to R1).
    Guidance: No explanation is required. Take whatever space is required to show the solution.

3. Modify the system in question 1 to include a third file H for which session A has the (H,r) permission, while sessions B and C have no access to H. Hint: Consider adding a third role.
    Guidance: No explanation is required. Take whatever space is required to show the modification.

4. Consider the following ABAC system:
    - There are 3 subjects A, B, C
    - There are 2 files (objects) F, G
    - There is one atomic-valued subject attribute called Dept with possible values CS, CE and IS
    - Dept(A) = CS, Dept(B) = CE, Dept(C) = IS
    - There is one atomic-valued object attribute called Type with possible values Sci and Engg
    - Type(F) = Sci, Type(G) = Engg
    - The following authorization predicate is defined for the r right:

    $$\text{Auth}_r(\text{Subject},\text{File}) \equiv (\text{Dept(Subject)}=\text{CS} \wedge \text{Type(File)}=\text{Sci}) \vee$$
    $$(\text{Dept(Subject)}=\text{CE} \wedge \text{Type(File)}=\text{Engg}) \vee$$
    $$(\text{Dept(Subject)}=\text{IS})$$

    Construct an access matrix to show the resulting rights for each subject for each file.
    Guidance: No explanation is required. Take whatever space is required to show the solution.

5. Modify the ABAC system in question 4 to include a third file H for which subject A has the (H,r) permission, while subjects B and C have no access to H. Hint: Consider adding a third value for the Type attribute.
    Guidance: No explanation is required. Take whatever space is required to show the modification.