1) **Fracture vs. Frictional Sliding** [25] Calculate the maximum length of a thrust sheet that can be pushed from the rear as a coherent block, prior to internal failure. Include a sketch that defines all relevant parameters. Assume that the block: 1) rests on a horizontal surface with friction coefficient \( \mu \) and 2) obeys the Coulomb criterion for shear failure with cohesion \( C \) and coefficient of internal friction \( \mu' \). Present your answer in simplified form, with specific values given for a few reasonable values of the relevant parameters. Cite any references used.

2) **Coulomb Failure** [25] Starting from the Coulomb failure criterion and a stress state \( \sigma_1 > \sigma_2 \), derive the optimum angle for Coulomb failure in terms of the relationship between \( \alpha \) and the Coulomb parameters \( \tau, \mu' \) and \( C \), where \( \alpha \) is the angle between \( \sigma_1 \) and the normal to the eventual failure plane, \( \mu' \) is the coefficient of internal friction and \( C \) is the cohesion. State carefully whether the optimum angle \( \alpha \) depends on \( \mu' \) and/or \( C \).

You may proceed geometrically, or you might like to proceed algebraically, using calculus (hint: failure occurs when the difference between \( \tau \) and \( (\mu' \sigma_n) \) is maximum, which you can find by writing \( \tau \) and \( \sigma \) in terms of \( \alpha \) and taking a derivative.)