مطلوب تسليم هذا التقرير يوم ########مع التقرير رقم 1-

Report # (2A) (1-D flow in variable area duct without Normal Shock Wave)

(1) At section (1) in the isentropic flow of CO_2, P_1=40 kPa(abs,) T_1=60 ^oC, and V_1=350m/s. Determine the flow velocity, V_2, in m/s at another section (2), where the Mach number is M_2=2.0. Also calculate area ratio, A_2/A_1. Sketch the duct shape A_1 to A_2 (assume γ=1.3).

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(2) Air flowing through an adiabatic, frictionless duct is supplied from a large supply tank in which P = 500 kPa and T = 400 K. What are the Mach number Ma. the temperature T, density , and fluid V at a location in this duct where the pressure is 430 kPa?

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(3) During a reaction test of a turbo-jet engine, the measurements (relative to the engine) showed an engine thrust force of 8800 N when the air flow rate was=14 kg/s. The flow temperature at the entrance to the thrust nozzle was T_1=1053 K and the velocity was V_1 =90 m/s. The nozzle had no divergent part and the exhaust stream reached atmospheric pressure somewhere outside the exit plane of the nozzle (i.e., $P_{exit} \neq P_{atm}$). Assume no heat loss from the gases and that the direction of air stream entering the engine was perpendicular to the direction of the thrust and that the nozzle is frictionless. Find the pressure and area at the inlet and exit planes (assume γ&R for the gases as those for air).
