FUEL AND CO2 MODELING – BASIC CALCULATIONS

A. Background Information

	kgCO2/kg_fuel	3.16

B. Total Fuel (kg) Used by the Aircraft as Function of Great-circle Trip Distance (nmi)

	125	250	500	750	1000	1500	2000
AT7	352	567	999	1430	1861	2722	3581
CR7	929	1324	2022	2737	3483	5063	6682
CR9	1023	1444	2206	3008	3824	5486	7201

C. Nominal Seat Capacity

AT7	70
CR7	70
CR9	90

D. Number of Engines, Fuel Consumption Rates (kg/sec), and NOx Emission Indices (g/kg_fuel)

	Number of Engines	Fuel (kg/s) 100% thrust	Fuel (kg/s) 85% thrust	Fuel (kg/s) 30% thrust	Fuel (kg/s) 7% thrust	EI NOx 100% thrust	EI NOx 85% thrust	EI NOx 30% thrust	EI NOx 7% thrust
AT7	2	0.15	0.14	0.08	0.05	16.8	15	9.4	6.6
CR7	2	0.6080	0.4790	0.17	0.07	13.82	12.00	9.85	4.03
CR9	2	0.648	0.530	0.179	0.064	14.69	12.60	10.75	4.60

E. Questions

1. If fuel efficiency is defined as fuel expended per unit distance, how do these three aircraft compare, as a function of trip distance?

2. If fuel efficiency is defined as fuel expended per unit seat distance, how do these three aircraft compare, as a function of trip distance?

3. What is the total CO2 and the CO2 emitted per passenger for these aircraft, as a function of trip distance?

4. What is the total NOx and the NOx emitted per passenger for these aircraft, as a function of trip distance?

Assume that the aircraft spends 16 minutes in taxi-out mode (7% thrust), 0.7 minutes in takeoff mode (100% thrust), 2.2 minutes in climbing to 3000 feet (85% thrust), 4 minutes in descending from 3000 feet, and 10 minutes in taxi-in mode (7% thrust). For simplicity, assume the remainder of the flight has an average thrust of 30%.