Assignment 1

1. 1) Frailty is physical weakness; lack of health or strength. Reduced grip strength in females correlated with higher frailty scores and vice versa. Hand grip strength can be quantified by measuring the amount of static force that the hand can squeeze around a dynamometer. The force has most commonly been measured in kilograms and pounds. The table below represents data from 10 female participants. The Height is measured in inches, Weight in pounds, Age in years, Grip strength in kilograms. Frailty is qualitative attribute indicated the presence or absence of the symptoms. (10 points)

Height	Weight	Age	Grip strength	Frailty
65.8	112	30	30	N
71.5	136	19	31	N
69.4	153	45	29	N
68.2	142	22	28	Y
67.8	144	29	24	Y
68.7	123	50	26	N
69.8	141	51	22	Y
70.1	136	23	20	Y
67.9	112	17	19	N
66.8	120	39	31	N

Based on the following table, **you must design AND implement a three-stage workflow (ingest → process → analyze) with code and organized outputs.** (reference study case in chapter 3). You need to save the raw data in csv file and read it into a pandas data frame and then perform the following:

a. Unit standardization
   i. `Height_m = Height_in * 0.0254`
   ii. `Weight_kg = Weight_lb * 0.45359237`

b. Feature engineering
   i. `BMI = Weight_kg / (Height_m ** 2)` (round to 2 decimals).
   ii. `AgeGroup` (categorical): `"<30"`, `"30–45"`, `"46–60"`, `">60"` based on `Age_yr`.

c. Categorical → numeric encoding
   i. Binary encoding: `Frailty_binary` (Y→1, N→0, store as `int8`).
   ii. One-hot encode `AgeGroup` into columns: `AgeGroup_<30`, `AgeGroup_30–45`, `AgeGroup_46–60`, `AgeGroup_>60`

d. EDA & Reporting
   I. Compute summary table: mean/median/std for numeric columns; save to reports/findings.md .
   II. Quantify relation of strength ↔ frailty: compute correlation between `Grip_kg` and `Frailty_binary`, and report it.