Programming Project #3

Metric English Conversion

Write a C++ *menu-driven* program that can convert between the Metric and English systems.
The conversion should *exactly* cover the following fields and sub-fields:

1. **Distance**:
   - Inch to centimeter and reverse order. (1 inch = 2.54 centimeter)
   - Foot to meter and reversed order. (1 foot = 0.3048 meter)
   - Mile to kilometer and reversed order. (1 mile = 1.609 kilometer)

2. **Weight**:
   - Ounce to the gram and reversed order. (1 ounce = 28.349 gram)
   - Pound to kilogram and reversed order. (1 pound = 0.453 kilogram)

3. **Volume**:
   - Ounce to milliliter and reversed order. (1 ounce = 29.573 milliliter)
   - Gallon to liter and reversed order. (1 gallon = 3.785 liter)
   - Quart to liter and reversed order. (1 quart = 0.946 liter)

4. **Pressure**:
   - PSI to Kg/cm and reversed order. (1 PSI = 0.07 kg/cm)

5. **Temperature**
   - Fahrenheit to Celsius and reversed order.

   [Celsius = (5 / 9) × (Fahrenheit – 32)]

USEFUL CONVERSION FACTORS AND RELATIONSHIPS

Length

SI unit: meter (m)

1 km = 0.62137 mi
1 mi = 5280 ft
= 1.6093 km
1 m = 1.0936 yd
1 in = 2.54 cm (exactly)
1 cm = 0.39370 in
1 Å = 10^{-10} m

Mass

SI unit: kilogram (kg)

1 kg = 2.2046 lb
1 lb = 453.59 g
= 16 oz
1 amu = $1.6605402 \times 10^{-24}$ g

Temperature

SI unit: Kelvin (K)

0 K = −273.15°C
= −459.67°F
K = °C + 273.15
$°C = \frac{5}{9}(°F - 32°)$
$°F = \frac{9}{5}\ °C + 32°$

Energy (derived)

SI unit: Joule (J)

1 J = 1 kg-m^2/s^2
1 J = 0.23901 cal
= 1 C × 1 V
1 cal = 4.184 J
1 eV = 1.602×10^{-19} J

Pressure (derived)

SI unit: Pascal (Pa)

1 Pa = 1 N/m^2
= 1 kg/m-s^2
1 atm = 101.325 kPa
= 760 torr
= 14.70 lb/in^2
1 bar = 10^5 kPa

Volume (derived)

SI unit: cubic meter (m^3)

1 L = 10^{-3} m^3
= 1 dm^3
= 10^3 cm^3
= 1.0567 qt
1 gal = 4 qt
= 3.7854 L
1 cm^3 = 1 mL
1 in^3 = 16.4 cm^3

Input validation:
Don't accept negative values entered for all conversions, except for temperature conversion.

Menu-Driven Program is a program that obtains input from a user by displaying a list of options, known as the menu, from which the user indicates his/her choice. From a choice, it might lead to a sub-menu with another nested set of choices. After being done and exiting a choice from the sub-menu, it must go back to the main menu. And only exiting from the main menu will end the program. With a choice, there could be several nested sub-menus. So, when a sub-menu is done it must go back to its outer menu. (2 points deducted for NOT USING the pattern)