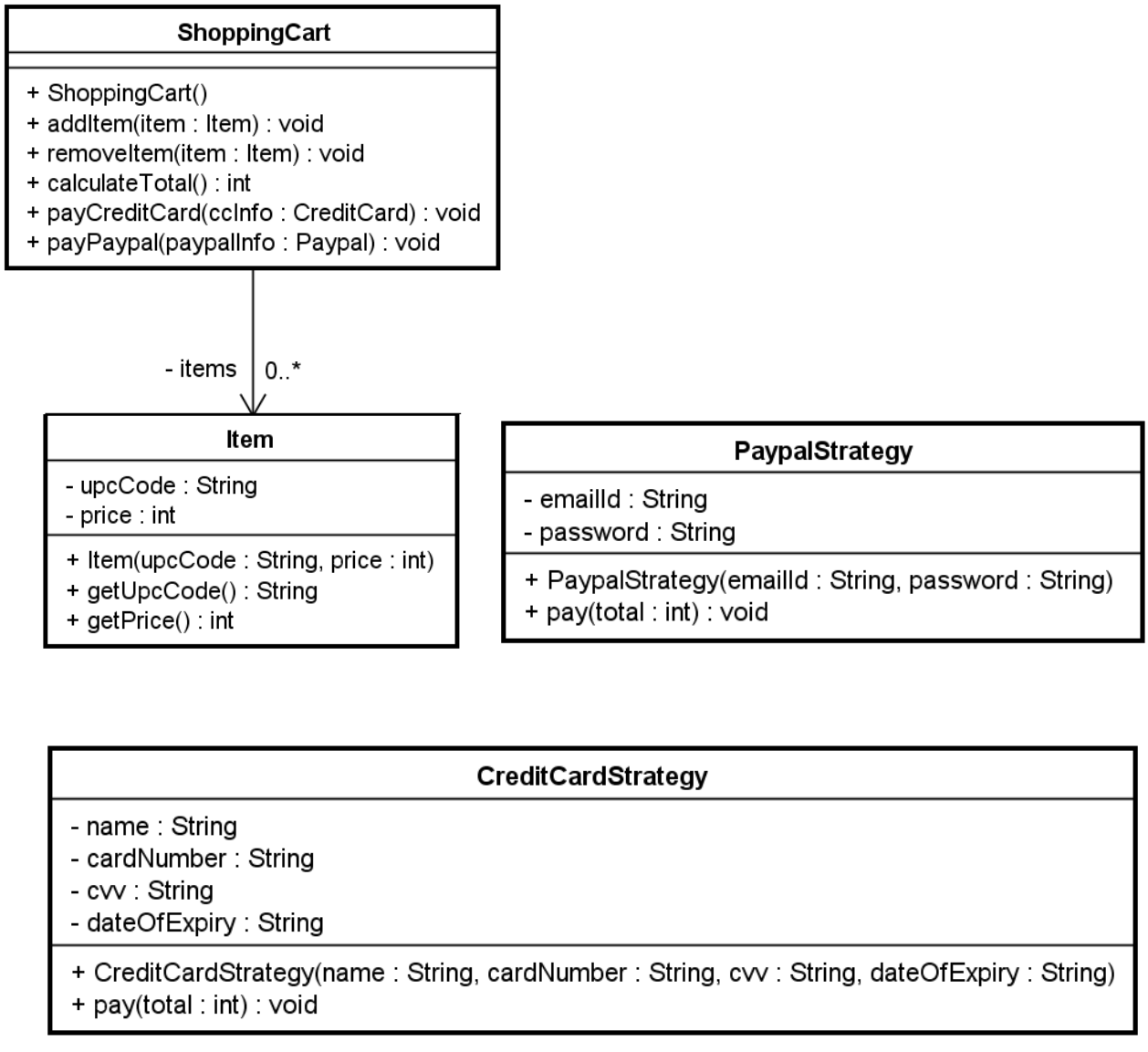
Homework 1 (Due: *8 April 2021 at Noon*)

Remarks: In CSCMS (zipped project, IDE mut be specified in file name)

1. From the below UML Class Diagram, the class ShoppingCart lets customers pay for items in the Cart by using either Credit Card or Paypal.

Instruction: Use the Strategy pattern to refactor the class ShoppingCart such that it is now possible to change the payment method at runtime (without re-compiling), and to add new payment methods without modifying code in ShoppingCart.

Coding: Write Java application to demonstrate how your ShoppingCart strategy works according to the above requirements. For convenience, the classes CreditCardStrategy and PaypalStrategy are given.



2. [From Observer Pattern – Weather Station]

Johnny Hurricane, Weather-O-Rama's CEO just called, they can't possibly ship without a Heat Index display element. Here are the details:

The heat index is an index that combines temperature and humidity to determine the apparent temperature (how hot it actually feels). To compute the heat index, you take the temperature, T, and the relative humidity, RH, and use this formula:

$$\begin{aligned} heatindex = {} & 16.923 + 1.85212 * 10^{-1} * T + 5.37941 * RH - 1.00254 * 10^{-1} * T * RH \\ & + 9.41695 * 10^{-3} * T^2 + 7.28898 * 10^{-3} * RH^2 + 3.45372 * 10^{-4} * T^2 * RH \\ & - 8.14971 * 10^{-4} * T * RH^2 + 1.02102 * 10^{-5} * T^2 * RH^2 - 3.8646 * 10^{-5} * T^3 \\ & + 2.91583 * 10^{-5} * RH^3 + 1.42721 * 10^{-6} * T^3 * RH + 1.97483 * 10^{-7} * T * RH^3 \\ & - 2.18429 * 10^{-8} * T^3 * RH^2 + 8.43296 * 10^{-10} * T^2 * RH^3 - 4.81975 * 10^{-11} * T^3 * RH^3 \end{aligned}$$

(Equation provided in "**heatindex.txt**").

Modify the given code to add the Heat Index calculation capability. The output should appear as shown below.