EGCI 213

Group Project 1 – Order Processing

The project can be done in a group of <= 5 students. Each group must do the project by themselves:

- **Everyone involved in cheating, either as source or copier, will get ZERO point.**
- If late submitting group copies code from a graded group, the graded group will still be penalized.
- If I suspect that you don't do the project all by yourself (taking code from ChatGPT is counted as not doing the project by yourself), I may ask you to do programming quizzes about the suspicious points in person.

```
code, name,          unit price
AP,   Air Purifiers,     18920
DL,   Digital Locks,     12550
HD,   Hand Dryers,        7500
```

1. Implement **class Product** that represents an individual product read from products.txt. The first line of the file = column descriptions: product code, product name, and unit price.

- Your class should have variables to keep total sales in cash and total sales in units.
- Don't hard code product information. I may change values in some columns when grading. I may also add or remove a few products (#products is not fixed).

2. Implement **class Customer** that represents an individual customer. Customer names are read from orders.txt. Your class should have a variable to keep points calculated from purchase order.

```
id, name,  product code, units, installment plan
1,  Aaron, AP,           10,    6
2,  Blake, AP,            5,    0
3,  Colin, DL,           20,   10
4,  Dylan, HD,           15,    3
5,  Blake, DL,            5,    0
```

3. Implement **class Order** that represents an individual order read from orders.txt. The first line of the file = column descriptions: order ID, customer name, product code (see (1)), #units, and installment plan (see (4)).

- There will be only 1 product per order.
- Lines that contain identical names are purchase orders by the same customers, e.g. orders 2 and 5 are from the same person (Blake)
- Don't hard code order information. I may change values in some columns when grading. I may also add or remove a few orders (#orders is not fixed).

```
months, monthly interest
0,      0
3,      0.5
6,      0.6
10,     0.7
```

4. Implement another class to **handle installment plans**. You can make your class represent either an individual plan or all plans offered by the shop. Available plans are read from installments.txt. The first line of the file = column descriptions: #months and monthly interest.

- Plans are identified by #months for payment. 0-month plan means full payment.
- Don't hard code plan information. I may change values in some columns when grading. I may also add or remove a few plans (#plans is not fixed).

5. Implement main class with main method
   - 5.1 Read data from all input files
   - 5.2 **Process each order** (put calculation details in appropriate classes).
     - 5.2.1 Calculate sub-total(1) from product price and units purchased.
       - Also calculate points earned from the current order, which is 1 full point for every 500 THB. Fractions are excluded. These points can be used to get discount in the next order, but not this order.
       - Keep this order (or at least order ID + customer name) for the product's lucky draw in (5.3).

5.2.2 Calculate sub-total(2) from sub-total(1) – discount
- If this is the customer's first order, discount = 200 THB
- If this customer already exists, redeem 100 points for 5% discount. Only 5% discount can be given per order (even if the customer has e.g. 200 points).

5.2.3 If the customer chooses full payment, then total payment = sub-total(2)

5.2.4 If the customer chooses other installment plans
- Calculate total interest from sub-total(2) * monthly interest * #months
- Calculate total payment from sub-total(2) + total interest
- Calculate monthly payment

5.2.5 Report result for each order. The output format is up to your design. But show at least the following, so I can check that your calculation is correct: order ID, customer name & point update, sub-total(1), sub-total(2), total payment, and monthly payment.

5.3 **Report product summary** (put calculation details in appropriate classes).

5.3.1 Report total sales in units and in cash of all products, sorted in decreasing order of unit sales and by alphabetical order of name.

5.3.2 For each product, draw a lucky winner from all the orders of this product. Report order ID and customer name.

5.4 **Report customer summary** (put calculation details in appropriate classes).

5.4.1 Report remaining points of all customers, sorted in decreasing order of points and by alphabetical order of name.

6. The program must be able to handle the following errors/exceptions

6.1 Missing files – if any input file is missing. For all input files, don't remove the first lines but skip them when reading the files.

6.2 There may be input errors in orders.txt as in orders_errors.txt, but no input error in other files.
- Missing values in some columns
- Format errors, e.g. "O (oh)" instead of "0 (zero)"
- Invalid values, e.g. #units <= 0, invalid product code, invalid installment plan.

You may handle these errors by:
- Skipping the whole line, if exceptions are due to invalid or missing values. Values in the skipped lines must not be added in the calculation.
- But exceeding columns that don't cause exception or wrong calculation can just be ignored (i.e. lines containing exceeding columns can be treated as normal lines).
- All exceptions must be reported, so I can check whether your calculation is correct.

6.3 Handling the above errors/exceptions means your program must be able to continue and give correct output. Printing messages and ending the program doesn't count as proper exception handling.

7. Package and folder structure must be correct

7.1 Your source files (.java) must be in folder Project1_XXX where XXX = full ID of the group representative, assuming that this folder is under Maven's "src/main/java" structure. The first lines of all source files must be comments containing names & IDs of all members.

7.2 Input files must be read from Project1_XXX. Don't use absolute path that is valid only on your PC.

7.3 Add readme.txt containing names & IDs of all members in Project1_XXX.

Submission

1. Group representative zips and submits Project1_XXX to Google classroom
2. Other members submit only readme.txt to Google classroom

Grading

3.5 points	requirements + correct results	(points, sub-totals, total & monthly payment)
2 points	correct summary reports	(sorted products + lucky winner, sorted customers)
1.5 points	proper exception handling	(missing files, input errors)
3 points	proper design & programming in OOP style	

Late submission: -0.5 points for <1 week late; -1 point for each 1 full week late

Demo 1: no exception

```
Read from src/main/java/Project1/products.txt
Air Purifiers   (AP)    unit price = 18,920
Digital Locks   (DL)    unit price = 12,550
Hand Dryers     (HD)    unit price =  7,500

Read from src/main/java/Project1/installments.txt
 0-month plan    monthly interest = 0.00%
 3-month plan    monthly interest = 0.50%
 6-month plan    monthly interest = 0.60%
10-month plan    monthly interest = 0.70%

Read from src/main/java/Project1/orders.txt
Order  1 >> Aaron   Air Purifiers  x 10    6-month installments
Order  2 >> Blake   Air Purifiers  x  5    0-month installments
Order  3 >> Colin   Digital Locks  x 20   10-month installments
Order  4 >> Dylan   Hand Dryers    x 15    3-month installments
Order  5 >> Blake   Digital Locks  x  5    0-month installments
Order  6 >> Colin   Hand Dryers    x 15    6-month installments
Order  7 >> Erica   Air Purifiers  x 20   10-month installments
Order  8 >> Blake   Hand Dryers    x 25    3-month installments
Order  9 >> Fiona   Hand Dryers    x 20    3-month installments
Order 10 >> Colin   Air Purifiers  x 30   10-month installments
Order 11 >> Gavin   Air Purifiers  x 10    6-month installments
Order 12 >> Aaron   Hand Dryers    x 10   10-month installments
Order 13 >> Dylan   Digital Locks  x 50    6-month installments
Order 14 >> Colin   Digital Locks  x 20    6-month installments

=== Order processing ===
 1. Aaron (     0 pts)  order    = Air Purifiers  x 10   sub-total(1)   =   189,200.00  (+   378 pts next order)
                        discount =       200.00         sub-total(2)   =   189,000.00
                        6-month installments            total interest =     6,804.00
                        total    =   195,804.00         monthly total  =    32,634.00

 2. Blake (     0 pts)  order    = Air Purifiers  x  5   sub-total(1)   =    94,600.00  (+   189 pts next order)
                        discount =       200.00         sub-total(2)   =    94,400.00       Points for order 5,
                        full payment                                                       not this order
                        total    =    94,400.00

 3. Colin (     0 pts)  order    = Digital Locks  x 20   sub-total(1)   =   251,000.00  (+   502 pts next order)
                        discount =       200.00         sub-total(2)   =   250,800.00
                        10-month installments           total interest =    17,556.00
                        total    =   268,356.00         monthly total  =    26,835.60

 4. Dylan (     0 pts)  order    = Hand Dryers    x 15   sub-total(1)   =   112,500.00  (+   225 pts next order)
                        discount =       200.00         sub-total(2)   =   112,300.00
                        3-month installments            total interest =     1,684.50
                        total    =   113,984.50         monthly total  =    37,994.83

 5. Blake (   189 pts)  order    = Digital Locks  x  5   sub-total(1)   =    62,750.00  (+   125 pts next order)
                        discount =     3,137.50         sub-total(2)   =    59,612.50  (-   100 pts)
                        full payment                                                       Remaining points
                        total    =    59,612.50                                        = (189-100) + 125 = 214
```

```
 6. Colin (   502 pts)  order    = Hand Dryers    x 15   sub-total(1)   =   112,500.00  (+   225 pts next order)
                        discount =     5,625.00          sub-total(2)   =   106,875.00  (-   100 pts)
                        6-month installments             total interest =     3,847.50
                        total    =   110,722.50          monthly total  =    18,453.75

 7. Erica (     0 pts)  order    = Air Purifiers  x 20   sub-total(1)   =   378,400.00  (+   756 pts next order)
                        discount =       200.00          sub-total(2)   =   378,200.00
                        10-month installments            total interest =    26,474.00
                        total    =   404,674.00          monthly total  =    40,467.40

 8. Blake (   214 pts)  order    = Hand Dryers    x 25   sub-total(1)   =   187,500.00  (+   375 pts next order)
          Points from   discount =     9,375.00          sub-total(2)   =   178,125.00  (-   100 pts)
          order 5       3-month installments             total interest =     2,671.88
                        total    =   180,796.88          monthly total  =    60,265.63

 9. Fiona (     0 pts)  order    = Hand Dryers    x 20   sub-total(1)   =   150,000.00  (+   300 pts next order)
                        discount =       200.00          sub-total(2)   =   149,800.00
                        full payment
                        total    =   149,800.00

10. Colin (   627 pts)  order    = Air Purifiers  x 30   sub-total(1)   =   567,600.00  (+ 1,135 pts next order)
                        discount =    28,380.00          sub-total(2)   =   539,220.00  (-   100 pts)
                        10-month installments            total interest =    37,745.40
                        total    =   576,965.40          monthly total  =    57,696.54

11. Gavin (     0 pts)  order    = Air Purifiers  x 10   sub-total(1)   =   189,200.00  (+   378 pts next order)
                        discount =       200.00          sub-total(2)   =   189,000.00
                        6-month installments             total interest =     6,804.00
                        total    =   195,804.00          monthly total  =    32,634.00

12. Aaron (   378 pts)  order    = Hand Dryers    x 10   sub-total(1)   =    75,000.00  (+   150 pts next order)
                        discount =     3,750.00          sub-total(2)   =    71,250.00  (-   100 pts)
                        10-month installments            total interest =     4,987.50
                        total    =    76,237.50          monthly total  =     7,623.75

13. Dylan (   225 pts)  order    = Digital Locks  x 50   sub-total(1)   =   627,500.00  (+ 1,255 pts next order)
                        discount =    31,375.00          sub-total(2)   =   596,125.00  (-   100 pts)
                        6-month installments             total interest =    21,460.50
                        total    =   617,585.50          monthly total  =   102,930.92

14. Colin ( 1,662 pts)  order    = Digital Locks  x 20   sub-total(1)   =   251,000.00  (+   502 pts next order)
                        discount =    12,550.00          sub-total(2)   =   238,450.00  (-   100 pts)
                        6-month installments             total interest =     8,584.20
                        total    =   247,034.20          monthly total  =    41,172.37


=== Product summary ===
Digital Locks    total sales =  95 units   =  1,192,250.00 THB   lucky draw winner = Blake (order  5)
Hand Dryers      total sales =  85 units   =    637,500.00 THB   lucky draw winner = Dylan (order  4)
Air Purifiers    total sales =  75 units   =  1,419,000.00 THB   lucky draw winner = Blake (order  2)

=== Customer summary ===
Colin   remaining points =  2,064
Dylan   remaining points =  1,380
Erica   remaining points =    756
Blake   remaining points =    489
Aaron   remaining points =    428
Gavin   remaining points =    378
Fiona   remaining points =    300
------------------------------------------------
BUILD SUCCESS
------------------------------------------------
```

- Winners can be different in different runs.
- Each winner is randomed from each product's orders, e.g. only orders 1, 2, 7, 10, 11 are eligible for AP lucky draw.

Demo 2: with exceptions

```
java.io.FileNotFoundException: src\main\java\Project1\product.txt (The system cannot find the file specified)
Enter correct file name =
products

java.io.FileNotFoundException: src\main\java\Project1\products (The system cannot find the file specified)
Enter correct file name =
products.txt

Read from src/main/java/Project1/products.txt
Air Purifiers  (AP)    unit price = 18,920
Digital Locks  (DL)    unit price = 12,550
Hand Dryers    (HD)    unit price =  7,500

java.io.FileNotFoundException: src\main\java\Project1\installment.txt (The system cannot find the file specified)
Enter correct file name =
install

java.io.FileNotFoundException: src\main\java\Project1\install (The system cannot find the file specified)
Enter correct file name =
installments

java.io.FileNotFoundException: src\main\java\Project1\installments (The system cannot find the file specified)
Enter correct file name =
installments.txt

Read from src/main/java/Project1/installments.txt
 0-month plan    monthly interest = 0.00%
 3-month plan    monthly interest = 0.50%
 6-month plan    monthly interest = 0.60%
10-month plan    monthly interest = 0.70%

java.io.FileNotFoundException: src\main\java\Project1\orders_error.txt (The system cannot find the file specified)
Enter correct file name =
orders_errors

java.io.FileNotFoundException: src\main\java\Project1\orders_errors (The system cannot find the file specified)
Enter correct file name =
orders_err.txt

java.io.FileNotFoundException: src\main\java\Project1\orders_err.txt (The system cannot find the file specified)
Enter correct file name =
orders_errors.txt
```

Missing files handling

```
Read from src/main/java/Project1/orders_errors.txt
Project1.InvalidInputException: For product: "AX"
1,  Aaron, AX,           10,    6        --> skip this line

java.lang.NumberFormatException: For input string: "O"
2,  Blake, AP,            5,    O        --> skip this line

Project1.InvalidInputException: For units: "-20"
3,  Colin, DL,          -20,   10        --> skip this line

Project1.InvalidInputException: For installment plan: "15"
4,  Dylan, HD,           15,   15        --> skip this line

java.lang.ArrayIndexOutOfBoundsException: Index 4 out of bounds for length 4
5,  Blake, DL,                0        --> skip this line

java.lang.NumberFormatException: For input string: "1.5"
6,  Colin, HD,          1.5,   6.5       --> skip this line

Order  7 >> Erica   Air Purifiers  x 20   10-month installments
Order  8 >> Blake   Hand Dryers    x 25    3-month installments
Order  9 >> Fiona   Hand Dryers    x 20    0-month installments
Order 10 >> Colin   Air Purifiers  x 30   10-month installments
Order 11 >> Gavin   Air Purifiers  x 10    6-month installments
Order 12 >> Aaron   Hand Dryers    x 10   10-month installments
Order 13 >> Dylan   Digital Locks  x 50    6-month installments
Order 14 >> Colin   Digital Locks  x 20    6-month installments
```

Input errors handling

```
=== Order processing ===
 7. Erica (     0 pts)  order    = Air Purifiers  x 20   sub-total(1)   =   378,400.00  (+   756 pts next order)
                        discount =       200.00          sub-total(2)   =   378,200.00
                        10-month installments           total interest =    26,474.00
                        total    =   404,674.00          monthly total  =    40,467.40

 8. Blake (     0 pts)  order    = Hand Dryers    x 25   sub-total(1)   =   187,500.00  (+   375 pts next order)
                        discount =       200.00          sub-total(2)   =   187,300.00
                        3-month installments            total interest =     2,809.50
                        total    =   190,109.50          monthly total  =    63,369.83

 9. Fiona (     0 pts)  order    = Hand Dryers    x 20   sub-total(1)   =   150,000.00  (+   300 pts next order)
                        discount =       200.00          sub-total(2)   =   149,800.00
                        full payment
                        total    =   149,800.00

10. Colin (     0 pts)  order    = Air Purifiers  x 30   sub-total(1)   =   567,600.00  (+ 1,135 pts next order)
                        discount =       200.00          sub-total(2)   =   567,400.00
                        10-month installments           total interest =    39,718.00
                        total    =   607,118.00          monthly total  =    60,711.80

11. Gavin (     0 pts)  order    = Air Purifiers  x 10   sub-total(1)   =   189,200.00  (+   378 pts next order)
                        discount =       200.00          sub-total(2)   =   189,000.00
                        6-month installments            total interest =     6,804.00
                        total    =   195,804.00          monthly total  =    32,634.00

12. Aaron (     0 pts)  order    = Hand Dryers    x 10   sub-total(1)   =    75,000.00  (+   150 pts next order)
                        discount =       200.00          sub-total(2)   =    74,800.00
                        10-month installments           total interest =     5,236.00
                        total    =    80,036.00          monthly total  =     8,003.60

13. Dylan (     0 pts)  order    = Digital Locks  x 50   sub-total(1)   =   627,500.00  (+ 1,255 pts next order)
                        discount =       200.00          sub-total(2)   =   627,300.00
                        6-month installments            total interest =    22,582.80
                        total    =   649,882.80          monthly total  =   108,313.80

14. Colin ( 1,135 pts)  order    = Digital Locks  x 20   sub-total(1)   =   251,000.00  (+   502 pts next order)
                        discount =    12,550.00          sub-total(2)   =   238,450.00  (-   100 pts)
                        6-month installments            total interest =     8,584.20
                        total    =   247,034.20          monthly total  =    41,172.37


=== Product summary ===
Digital Locks     total sales =  70 units   =    878,500.00 THB   lucky draw winner = Dylan (order 13)
Air Purifiers     total sales =  60 units   =  1,135,200.00 THB   lucky draw winner = Erica (order  7)
Hand Dryers       total sales =  55 units   =    412,500.00 THB   lucky draw winner = Blake (order  8)

=== Customer summary ===
Colin    remaining points =  1,537
Dylan    remaining points =  1,255
Erica    remaining points =    756
Gavin    remaining points =    378
Blake    remaining points =    375
Fiona    remaining points =    300
Aaron    remaining points =    150
--------------------------------------------------------------------------
```

Values from skipped lines are excluded