

PROJECT SAS-R - EVALUATION 3 DU 01 NOVEMBRE 2025
DINH THI THAO NHUNG - NGUYEN LINH CHI

```

/* Import data */

libname Project 'C:\Users\nguyli22\Downloads\data';
proc import datafile= 'C:\Users\nguyli22\Downloads\data\transactions.csv'
out=Project.transactions
dbms=csv replace;
getnames=yes;
run;

proc import datafile= 'C:\Users\nguyli22\Downloads\data\customers.csv'
out=Project.customers
dbms=csv replace;
getnames=yes;
run;

proc import datafile= 'C:\Users\nguyli22\Downloads\data\products.csv'
out=Project.products
dbms=csv replace;
getnames=yes;
run;

proc import datafile= 'C:\Users\nguyli22\Downloads\data\products_transaction.csv'
out=Project.products_transaction
dbms=csv replace;
getnames=yes;
run;

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8.

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data project.products_transaction;
set project.products_transaction;
/* Extract the part after 'prod_X' */
product_id = input(substr(product, 7), best12.);
/* Create a new numeric variable */
if value = 'NA' then quantity = 0; /* replace NA by 0 */
else quantity = input(value, best12.); /* convert text to numeric */
run;

```

VIEWTABLE: Project.Products_transaction

	names	product	value	product_id	quantity
1	DOSS-GFEL-0028	prod_X1	6	1	6
2	DOSS-GFEL-0028	prod_X2	14	2	14
3	DOSS-GFEL-0028	prod_X3	33	3	33
4	DOSS-GFEL-0028	prod_X4	4	4	4
5	DOSS-GFEL-0028	prod_X5	76	5	76
6	DOSS-GFEL-0028	prod_X6	46	6	46
7	DOSS-GFEL-0028	prod_X7	22	7	22
8	DOSS-GFEL-0028	prod_X8	11	8	11
9	DOSS-GFEL-0028	prod_X9	9	9	9
10	DOSS-GFEL-0028	prod_X10	47	10	47
11	DOSS-GFEL-0028	prod_X11	20	11	20
12	DOSS-GFEL-0028	prod_X12	NA	12	0
13	DOSS-GFEL-0028	prod_X13	NA	13	0
14	DOSS-GFEL-0028	prod_X14	NA	14	0
15	DOSS-GFEL-0028	prod_X15	NA	15	0
16	DOSS-UWYV-0016	prod_X1	6	1	6
17	DOSS-UWYV-0016	prod_X2	NA	2	0
18	DOSS-UWYV-0016	prod_X3	NA	3	0
19	DOSS-UWYV-0016	prod_X4	NA	4	0
20	DOSS-UWYV-0016	prod_X5	NA	5	0
21	DOSS-UWYV-0016	prod_X6	NA	6	0
22	DOSS-UWYV-0016	prod_X7	NA	7	0
23	DOSS-UWYV-0016	prod_X8	NA	8	0

```

proc sql;
  create table project.question8 as
  SELECT
    c.num_client,
    c.first,
    c.last,
    c.region,
    c.departement,
    c.fidelity_points,
    SUM(p.price * pt.quantity) AS total_amount
  FROM project.customers AS c
  JOIN project.transaction AS t
    ON c.num_client = t.num_client
  JOIN project.products_transaction AS pt
    ON t.ref = pt.names
  JOIN project.products AS p
    ON p.id = pt.product_id
  GROUP BY
    c.num_client, c.first, c.last, c.region, c.departement, c.fidelity_points
  HAVING
    c.fidelity_points > 700
    AND calculated total_amount > 1000;
quit;

```

	num_client	first	last	region	departement	fidelity_points	total_amount
1	1	Solomon	Heaney	Lorraine	Meuse	1654	33514
2	2	Karma	Williamson-Marquardt	NA	NA	3296	29568
3	4	Laken	McDemott	Limousin	Creuse	2174	29225
4	6	Clayton	Rundfsson	Mid-Pyrénées	Tarn	1336	17217
5	12	Lindsey	Hills	Limousin	Corrèze	1612	23043
6	14	Duncan	Stokes	Basse-Normandie	Manche	1807	17918
7	19	Dr.	CasimiroHodkiewiczJr.	Lorraine	Meurthe-et-Moselle	1075	18280
8	22	Theresia	Hemilton	Lorraine	Moselle	1920	31086
9	23	Wyman	Frami	Corse	Haute-Corse	1286	3256
10	24	Karan	O'Connell	Basse-Normandie	Orne	1913	18427
11	29	Dr.	MetaSchamberger	Île-de-France	Val-de-Marne	1943	19241
12	30	Asbury	Cummings	Bretagne	NA	2352	22478
13	32	Bennie	Boyer	Picardie	Aisne	865	34518
14	37	Dewin	Kuphal	Languedoc-Roussillon	Gard	1264	25860
15	52	Jens	Paccacha	Corse	Haute-Corse	807	17724
16	60	Dr.	JenellWeimannJr.	Lorraine	Meuse	1655	36081
17	62	Miss	LavorHegmannDDS	Pays de la Loire	Mayenne	2393	20133
18	66	Franklin	MohrBartoletti	Provence-Alpes-Côte d'	Var	2303	8692
19	69	Miss	LeanConn	Pays de la Loire	Vendée	1850	34949
20	74	Sasha	Armstrong	Pays de la Loire	Vendée	1735	40084
21	87	Jovani	Sipes	Auvergne	Allier	1312	33820
22	88	Britany	Predovic	Limousin	Haute-Vienne	1033	24312
23	100	Garfield	Wymian-Waters	Aquitaine	Lot-et-Garonne	1404	11671
24	102	Cade	Turcotte	Champagne-Ardenne	Aube	1536	34251
25	103	Coy	Weissnat	Lorraine	Meurthe-et-Moselle	970	46316
26	109	Caleigh	Blanda	Languedoc-Roussillon	Aude	978	7643
27	111	Edmonia	Mueller	NA	Haute-Corse	2085	32299
28	113	Mrs.	TariLegrosMD	Champagne-Ardenne	Mame	1209	2933
29	114	Jennette	Schumm	Île-de-France	Paris	2379	55431
30	115	Dr.	HazelleSatterfield	Île-de-France	NA	2720	22994
31	116	Ms.	JeanieHartmann	Provence-Alpes-Côte d'	Hauts-Alpes	2162	22432
32	119	Ammon	Dickens	Pays de la Loire	Mayenne	1855	13167
33	120	Odell	Stokes	Corse	Corse-du-Sud	1325	33241
34	125	Cason	Bins	Champagne-Ardenne	Ardennes	807	43077
35	126	Mr.	NickEffertz	Bretagne	Morbihan	1944	36550
36	139	Zeno	Leuschke	NA	Hauts-de-Seine	2064	14202
37	141	Wilfrid	Harvey	Pays de la Loire	Mayenne	1804	25807
38	142	Mrs.	LavonneBreitenberg	Lorraine	Vosges	2504	41937
39	145	Dr.	JadeFranckilV	NA	Vaucluse	1704	8724
40	158	Derik	Rutherford	Bretagne	Morbihan	1739	54393
41	165	Mrs.	GiovannaRoobMD	Île-de-France	Hauts-de-Seine	1261	22762
42	168	Kareem	KoelpinGorczany	Île-de-France	Val-de-Marne	885	1638
43	171	Jiles	Lehner	Pays de la Loire	NA	1672	29380
44	181	Mrs.	IzbelBartellMD	Lorraine	Vosges	776	5811
45	182	Addyson	Nienow	Lorraine	Meuse	2379	30788

Le Système SAS							
num_client	first	last	region	departement	fidelity_points	total_amount	
1	Solomon	Heaney	Lorraine	Meuse	1654	33514	
2	Karma	Williamson-Marquardt	NA	NA	3296	29568	
3	Laken	McDemott	Limousin	Creuse	2174	29225	
4	Clayton	Rundfsson	Mid-Pyrénées	Tarn	1336	17217	
5	Lindsey	Hills	Limousin	Corrèze	1612	23043	
6	Duncan	Stokes	Basse-Normandie	Manche	1807	17918	
7	Dr.	CasimiroHodkiewiczJr.	Lorraine	Meurthe-et-Moselle	1075	18280	
8	Theresia	Hemilton	Lorraine	Moselle	1920	31086	
9	Wyman	Frami	Corse	Haute-Corse	1286	3256	
10	Karan	O'Connell	Basse-France	Orne	1913	18427	
11	Dr.	MetaSchamberger	Île-de-France	Val-de-Marne	1943	19241	
12	Asbury	Cummings	Bretagne	NA	2352	22478	
13	Bennie	Boyer	Picardie	Aisne	865	34518	
14	Dewin	Kuphal	Languedoc-Roussillon	Gard	1264	25860	
15	Jens	Paccacha	Corse	Haute-Corse	807	17724	
16	Dr.	JenellWeimannJr.	Lorraine	Meuse	1655	36081	
17	Miss	LavorHegmannDDS	Pays de la Loire	Mayenne	2393	20133	
18	Franklin	MohrBartoletti	Provence-Alpes-Côte d'	Var	2303	8692	
19	Miss	LeanConn	Pays de la Loire	Vendée	1850	34949	
20	Sasha	Armstrong	Pays de la Loire	Vendée	1735	40084	
21	Jovani	Sipes	Auvergne	Allier	1312	33820	
22	Britany	Predovic	Limousin	Haute-Vienne	1033	24312	
23	Garfield	Wymian-Waters	Aquitaine	Lot-et-Garonne	1404	11671	
24	Cade	Turcotte	Champagne-Ardenne	Aube	1536	34251	
25	Coy	Weissnat	Lorraine	Meurthe-et-Moselle	970	46316	
26	Caleigh	Blanda	Languedoc-Roussillon	Aude	978	7643	
27	Edmonia	Mueller	NA	Haute-Corse	2085	32299	
28	Mrs.	TariLegrosMD	Champagne-Ardenne	Mame	1209	2933	
29	Jennette	Schumm	Île-de-France	Paris	2379	65411	

9.

```
proc sql;
  create table project.question9 as
  select
    t.ref,
    t.timestamp,
    SUM(p.price * pt.quantity) AS transaction_amount
  from project.transaction as t
  inner join project.products_transaction as pt
    on t.ref = pt.names
  inner join project.products as p
    on p.id = pt.product_id
  where t.source_call = 'China'
  group by
    t.ref, t.timestamp
  having
    calculated transaction_amount > 100;
quit;
```

VIEWTABLE: Project.Question9			
	ref	timestamp	transaction_amount
1	DOSS-BGKO-0035	2022-09-20	6634
2	DOSS-DKFC-0073	2020-08-25	21898
3	DOSS-DMIO-0050	2021-11-26	19079
4	DOSS-FYLN-0053	2022-06-01	39802
5	DOSS-GFEL-0028	2016-09-28	10381
6	DOSS-IGEN-0041	2022-09-24	578
7	DOSS-JOYY-0029	2020-12-26	4873
8	DOSS-JRZB-0089	2022-04-06	8803
9	DOSS-JYQC-0086	2022-02-07	24312
10	DOSS-KLVH-0049	2022-04-12	30112
11	DOSS-KQIA-0025	2022-06-22	32299
12	DOSS-LBDE-0098	2022-02-18	8794
13	DOSS-NCKM-0019	2022-11-16	22189
14	DOSS-PKVJ-0100	2022-10-27	4860
15	DOSS-PUDS-0039	2022-11-28	6961
16	DOSS-QFKT-0014	2022-03-29	11439
17	DOSS-QPDW-0023	2022-11-10	22994
18	DOSS-RJYW-0048	2022-12-09	16741
19	DOSS-SIKH-0061	2022-05-10	4661
20	DOSS-UIOZ-0085	2020-10-08	36954
21	DOSS-XSLF-0099	2022-03-16	1548
22	DOSS-YHFC-0087	2022-02-16	8893
23	DOSS-YQJR-0062	2022-09-16	36081

10.

```
proc sql; /* calculate the total value of each transaction */
  create table project.question10_1 as
  select
    t.ref,
    t.num_client,
    t.timestamp,
    sum(p.price * pt.quantity) as transaction_amount
  from project.transaction as t
  inner join project.products_transaction as pt
    on t.ref = pt.names
  inner join project.products as p
    on p.id = pt.product_id
  group by
    t.ref, t.num_client, t.timestamp;
quit;
```

VIEWTABLE: Project.Question10_1				
ref	num_client	timestamp	transaction_amount	
1	DOSS-ABPW-0017	66 2022-11-30	8692	
2	DOSS-AJFP-0045	195 2023-01-02	17418	
3	DOSS-ARES-0064	152 2022-07-27	30649	
4	DOSS-ASUL-0009	120 2022-02-15	5471	
5	DOSS-BGOT-0076	32 2022-10-02	27226	
6	DOSS-BGKO-0035	178 2022-09-20	6334	
7	DOSS-BGU-0033	158 2022-08-02	5373	
8	DOSS-CRUE-0051	32 2022-06-25	5744	
9	DOSS-DKPC-0073	9 2020-08-25	21898	
10	DOSS-DMIO-0050	57 2021-11-26	19079	
11	DOSS-DSMI-0065	37 2020-11-05	20987	
12	DOSS-ECBG-0078	38 2022-03-26	16465	
13	DOSS-EFKS-0055	114 2021-12-19	55431	
14	DOSS-FCBH-0083	118 2021-12-28	23492	
15	DOSS-FIZV-0096	4 2022-03-23	29225	
16	DOSS-FMLI-0084	102 2022-12-28	34251	
17	DOSS-FOGD-0037	126 2022-06-30	26217	
18	DOSS-FYLN-0053	125 2022-06-01	39802	
19	DOSS-FZIH-0031	168 2022-11-11	1638	
20	DOSS-GFEL-0028	1 2016-09-28	10381	
21	DOSS-GKRE-0090	139 2022-07-19	14202	
22	DOSS-GSMZ-0080	30 2020-09-26	22478	
23	DOSS-HMYZ-0021	102 2022-10-21	40474	
24	DOSS-HPNY-0024	122 2022-11-19	1440	
25	DOSS-HRVK-0010	69 2021-09-03	34949	
26	DOSS-HUFY-0072	6 2021-03-26	5184	
27	DOSS-ICRG-0003	77 2021-07-10	8872	
28	DOSS-IGEN-0041	145 2022-09-24	578	
29	DOSS-IGXB-0044	125 2022-12-17	3275	
30	DOSS-IFY-0026	2 2022-10-31	29568	
31	DOSS-IVG-0030	152 2022-11-25	29571	
32	DOSS-MVX-0094	181 2023-01-02	5811	
33	DOSS-INUQ-0077	50 2021-07-11	11526	
34	DOSS-JHFP-0071	74 2022-04-11	40084	
35	DOSS-JGX-0001	31 2021-02-05	7240	
36	DOSS-JOYV-0029	37 2020-12-26	4873	
37	DOSS-JRB-0089	94 2022-04-06	8803	
38	DOSS-KXPD-0005	118 2022-09-13	3039	
39	DOSS-JYQC-0086	88 2022-02-07	24312	
40	DOSS-LKLH-0049	142 2022-04-12	30112	
41	DOSS-KNFB-0052	100 2022-10-21	11671	
42	DOSS-QIA-0025	111 2022-06-22	32299	
43	DOSS-LBDE-0098	91 2022-02-18	8794	
44	DOSS-MOPF-0070	182 2022-11-07	2253	
45	DOSS-MUPB-0002	79 2021-09-14	37328	
46	DOSS-MXCV-0058	116 2022-05-18	22432	
47	DOSS-MYVG-0034	82 2022-09-26	8501	
31	DOSS-JVQ-0030	158 2022-11-25	29571	
32	DOSS-IMVX-0094	181 2023-01-02	5811	
33	DOSS-INUG-0077	50 2021-07-11	11526	
34	DOSS-ISHP-0071	74 2022-04-11	40084	
35	DOSS-JGOX-0001	31 2021-02-05	7240	
36	DOSS-JOYV-0029	37 2020-12-26	4873	
37	DOSS-JRB-0089	94 2022-04-06	8803	
38	DOSS-JYQC-0086	88 2022-02-07	24312	
39	DOSS-LKLH-0049	142 2022-04-12	30112	
40	DOSS-KNFB-0052	100 2022-10-21	11671	
41	DOSS-QIA-0025	111 2022-06-22	32299	
42	DOSS-LBDE-0098	91 2022-02-18	8794	
43	DOSS-MOPF-0070	182 2022-11-07	2253	
44	DOSS-MUPB-0002	79 2021-09-14	37328	
45	DOSS-MXCV-0058	116 2022-05-18	22432	
46	DOSS-MYVG-0034	82 2022-09-26	8501	
31	DOSS-JVQ-0030	158 2022-11-25	29571	
32	DOSS-IMVX-0094	181 2023-01-02	5811	
33	DOSS-INUG-0077	50 2021-07-11	11526	
34	DOSS-ISHP-0071	74 2022-04-11	40084	
35	DOSS-JGOX-0001	31 2021-02-05	7240	
36	DOSS-JOYV-0029	37 2020-12-26	4873	
37	DOSS-JRB-0089	94 2022-04-06	8803	
38	DOSS-JYQC-0086	88 2022-02-07	24312	
39	DOSS-LKLH-0049	142 2022-04-12	30112	
40	DOSS-KNFB-0052	100 2022-10-21	11671	
41	DOSS-QIA-0025	111 2022-06-22	32299	
42	DOSS-LBDE-0098	91 2022-02-18	8794	
43	DOSS-MOPF-0070	182 2022-11-07	2253	
44	DOSS-MUPB-0002	79 2021-09-14	37328	
45	DOSS-MXCV-0058	116 2022-05-18	22432	
46	DOSS-MYVG-0034	82 2022-09-26	8501	
31	DOSS-JVQ-0030	158 2022-11-25	29571	
32	DOSS-IMVX-0094	181 2023-01-02	5811	
33	DOSS-INUG-0077	50 2021-07-11	11526	
34	DOSS-ISHP-0071	74 2022-04-11	40084	
35	DOSS-JGOX-0001	31 2021-02-05	7240	
36	DOSS-JOYV-0029	37 2020-12-26	4873	
37	DOSS-JRB-0089	94 2022-04-06	8803	
38	DOSS-JYQC-0086	88 2022-02-07	24312	
39	DOSS-LKLH-0049	142 2022-04-12	30112	
40	DOSS-KNFB-0052	100 2022-10-21	11671	
41	DOSS-QIA-0025	111 2022-06-22	32299	
42	DOSS-LBDE-0098	91 2022-02-18	8794	
43	DOSS-MOPF-0070	182 2022-11-07	2253	
44	DOSS-MUPB-0002	79 2021-09-14	37328	
45	DOSS-MXCV-0058	116 2022-05-18	22432	
46	DOSS-MYVG-0034	82 2022-09-26	8501	
31	DOSS-JVQ-0030	158 2022-11-25	29571	
32	DOSS-IMVX-0094	181 2023-01-02	5811	
33	DOSS-INUG-0077	50 2021-07-11	11526	
34	DOSS-ISHP-0071	74 2022-04-11	40084	
35	DOSS-JGOX-0001	31 2021-02-05	7240	
36	DOSS-JOYV-0029	37 2020-12-26	4873	
37	DOSS-JRB-0089	94 2022-04-06	8803	
38	DOSS-JYQC-0086	88 2022-02-07	24312	
39	DOSS-LKLH-0049	142 2022-04-12	30112	
40	DOSS-KNFB-0052	100 2022-10-21	11671	
41	DOSS-QIA-0025	111 2022-06-22	32299	
42	DOSS-LBDE-0098	91 2022-02-18	8794	
43	DOSS-MOPF-0070	182 2022-11-07	2253	
44	DOSS-MUPB-0002	79 2021-09-14	37328	
45	DOSS-MXCV-0058	116 2022-05-18	22432	
46	DOSS-MYVG-0034	82 2022-09-26	8501	
31	DOSS-JVQ-0030	158 2022-11-25	29571	
32	DOSS-IMVX-0094	181 2023-01-02	5811	
33	DOSS-INUG-0077	50 2021-07-11	11526	
34	DOSS-ISHP-0071	74 2022-04-11	40084	
35	DOSS-JGOX-0001	31 2021-02-05	7240	
36	DOSS-JOYV-0029	37 2020-12-26	4873	
37	DOSS-JRB-0089	94 2022-04-06	8803	
38	DOSS-JYQC-0086	88 2022-02-07	24312	
39	DOSS-LKLH-0049	142 2022-04-12	30112	
40	DOSS-KNFB-0052	100 2022-10-21	11671	
41	DOSS-QIA-0025	111 2022-06-22	32299	
42	DOSS-LBDE-0098	91 2022-02-18	8794	
43	DOSS-MOPF-0070	182 2022-11-07	2253	
44	DOSS-MUPB-0002	79 2021-09-14	37328	
45	DOSS-MXCV-0058	116 2022-05-18	22432	
46	DOSS-MYVG-0034	82 2022-09-26	8501	
31	DOSS-JVQ-0030	158 2022-11-25	29571	
32	DOSS-IMVX-0094	181 2023-01-02	5811	
33	DOSS-INUG-0077	50 2021-07-11	11526	
34	DOSS-ISHP-0071	74 2022-04-11	40084	
35	DOSS-JGOX-0001	31 2021-02-05	7240	
36	DOSS-JOYV-0029	37 2020-12-26	4873	
37	DOSS-JRB-0089	94 2022-04-06	8803	
38	DOSS-JYQC-0086	88 2022-02-07	24312	
39	DOSS-LKLH-0049	142 2022-04-12	30112	
40	DOSS-KNFB-0052	100 2022-10-21	11671	
41	DOSS-QIA-0025	111 2022-06-22	32299	
42	DOSS-LBDE-0098	91 2022-02-18	8794	
43	DOSS-MOPF-0070	182 2022-11-07	2253	
44	DOSS-MUPB-0002	79 2021-09-14	37328	
45	DOSS-MXCV-0058	116 2022-05-18	22432	
46	DOSS-MYVG-0034	82 2022-09-26	8501	
31	DOSS-JVQ-0030	158 2022-11-25	29571	
32	DOSS-IMVX-0094	181 2023-01-02	5811	
33	DOSS-INUG-0077	50 2021-07-11	11526	
34	DOSS-ISHP-0071	74 2022-04-11	40084	
35	DOSS-JGOX-0001	31 2021-02-05	7240	
36	DOSS-JOYV-0029	37 2020-12-26	4873	
37	DOSS-JRB-0089	94 2022-04-06	8803	
38	DOSS-JYQC-0086	88 2022-02-07	24312	
39	DOSS-LKLH-0049	142 2022-04-12	30112	
40	DOSS-KNFB-0052	100 2022-10-21	11671	
41	DOSS-QIA-0025	111 2022-06-22	32299	
42	DOSS-LBDE-0098	91 2022-02-18	8794	
43	DOSS-MOPF-0070	182 2022-11-07	2253	
44	DOSS-MUPB-0002	79 2021-09-14	37328	
45	DOSS-MXCV-0058	116 2022-05-18	22432	
46	DOSS-MYVG-0034	82 2022-09-26	8501	
31	DOSS-JVQ-0030	158 2022-11-25	29571	
32	DOSS-IMVX-0094	181 2023-01-02	5811	
33	DOSS-INUG-0077	50 2021-07-11	11526	
34	DOSS-ISHP-0071	74 2022-04-11	40084	
35	DOSS-JGOX-0001	31 2021-02-05	7240	
36	DOSS-JOYV-0029	37 2020-12-26	4873	
37	DOSS-JRB-0089	94 2022-04-06	8803	
38	DOSS-JYQC-0086	88 2022-02-07	24312	
39	DOSS-LKLH-0049	142 2022-04-12	30112	
40	DOSS-KNFB-0052	100 2022-10-21	11671	
41	DOSS-QIA-0025	111 2022-06-22	32299	
42	DOSS-LBDE-0098	91 2022-02-18	8794	
43	DOSS-MOPF-0070	182 2022-11-07	2253	
44	DOSS-MUPB-0002	79 2021-09-14	37328	
45	DOSS-MXCV-0058	116 2022-05-18	22432	
46	DOSS-MYVG-0034	82 2022-09-26	8501	
31	DOSS-JVQ-0030	158 2022-11-25	29571	
32	DOSS-IMVX-0094	181 2023-01-02	5811	
33	DOSS-INUG-0077	50 2021-07-11	11526	
34	DOSS-ISHP-0071	74 2022-04-11	40084	
35	DOSS-JGOX-0001	31 2021-02-05	7240	
36	DOSS-JOYV-0029	37 2020-12-26	4873	
37	DOSS-JRB-0089	94 2022-04-06	8803	
38	DOSS-JYQC-0086	88 2022-02-07	24312	
39	DOSS-LKLH-0049	142 2022-04-12	30112	
40	DOSS-KNFB-0052	100 2022-10-21	11671	
41	DOSS-QIA-0025	111 2022-06-22	32299	
42	DOSS-LBDE-0098	91 2022-02-18	8794</	

```

proc sql; /* Join both tables to get the most recent transaction + amount */
create table project.question10 as
select
  c.num_client,
  c.first,
  c.last,
  q101.ref,
  q101.timestamp,
  q101.transaction_amount
from project.customers as c
inner join project.question10_1 as q101
  on c.num_client = q101.num_client
inner join project.question10_2 as q102
  on q101.num_client = q102.num_client
  and q101.timestamp = q102.latest_timestamp;
quit;

```

VIEWTABLE: Project.Question10						35	79 Jovan O'Keefe-Hermann	DOSS-VGHZ-0092	2022-12-08	29560	
	num_client	first	last	ref	timestamp	transaction_amount	36	Rogahn	DOSS-MYYG-0034	2022-09-26	8501
1	1	Solomon	Heaney	DOSS-XDEO-0043	2021-01-22	23133	38	87 Jovani Sipes	DOSS-SKLO-0075	2023-01-18	14815
2	2	Karma	Williamson-Margardt	DOSS-UFY-0026	2022-10-31	29560	39	88 Britany Predovic	DOSS-JYCG-0086	2022-02-07	24312
3	4	Laken	McDermott	DOSS-FUZV-0096	2022-03-23	29225	40	91 Dr. KianaEffertz	DOSS-JRZF-0098	2022-02-18	8794
4	6	Clayton	Runnifson	DOSS-ZLBV-0046	2021-12-10	12033	41	94 Alea Nicolas-Krajcik	DOSS-JRZF-0089	2022-04-06	8803
5	8	Dr.	RonaldMuller	DOSS-SAVJ-0047	2020-09-08	35792	42	100 Garfield Wyman-Waters	DOSS-KNBR-0052	2022-10-21	11671
6	9	Mss	AlondraWiza	DOSS-DKFC-0073	2020-08-25	21898	43	102 Cade Turcotte	DOSS-FMLI-0084	2022-12-28	34251
7	10	Vernice	Ondricka-Keebler	DOSS-JUOZ-0085	2020-10-08	36954	44	103 Coy Weissnat	DOSS-HMYZ-0021	2022-10-21	40474
8	12	Lindsey	Hills	DOSS-NHFG-0036	2021-01-19	23043	45	105 Charle Monahan	DOSS-SIKH-0061	2022-05-10	4661
9	14	Duncan	Stokes	DOSS-ZPVB-0060	2022-02-08	17918	46	109 Caleigh Blanda	DOSS-RCOD-0018	2022-02-14	7643
10	19	Dr.	CasimiroHodkiewiczJr.	DOSS-QEKT-0038	2021-07-17	18280	47	111 Edmonia Mueller	DOSS-KQIA-0025	2022-06-22	32299
11	22	Theresa	Hemiston	DOSS-ORVD-0022	2021-08-02	30978	48	113 Mrs. TelLegrosMD	DOSS-NMVY-0074	2022-12-12	2933
12	23	Wyman	Frami	DOSS-XGPB-0054	2022-09-18	3256	49	114 Jennette Schumm	DOSS-EFKS-0055	2021-12-19	55431
13	24	Karan	O'Connell	DOSS-WPSG-0013	2021-01-02	18427	50	115 Dr. Hazelz Settlefield	DOSS-CPDW-0023	2022-11-10	22994
14	29	Dr.	MetaSchamberger	DOSS-QFTS-0059	2022-07-26	16890	51	116 Ms. JeanieHartmann	DOSS-MXCV-0058	2022-05-18	22432
15	30	Asbury	Cummings	DOSS-GSMZ-0080	2020-09-26	22478	52	118 Jamaron Oberbrunner	DOSS-JXPD-0005	2022-09-13	3039
16	31	Loren	Larson	DOSS-IGOX-0001	2021-02-05	7240	53	119 Ammon Dickens	DOSS-WYBN-0081	2023-01-18	13167
17	32	Bennie	Boyer	DOSS-BDGT-0076	2023-10-02	27226	54	120 Addell Stokes	DOSS-ASUL-0009	2022-02-15	5471
18	33	Lydell	Emser	DOSS-QZBJ-0082	2021-03-12	20271	55	123 Cason Bir	DOSS-IGXB-0044	2022-12-17	3275
19	36	Mr.	NicholasOrn	DOSS-QXPKT-0014	2022-03-29	11439	56	125 Mr. NickEffertz	DOSS-HPNY-0024	2022-11-19	1440
20	37	Devwin	Kuphal	DOSS-JOVY-0029	2020-12-26	4873	57	127 Many Trantow	DOSS-YDNM-0063	2022-06-08	32282
21	38	Belva	Jast-Brown	DOSS-ECBG-0078	2022-03-14	16465	58	139 Zeno Leuschke	DOSS-GKRE-0090	2022-07-19	14202
22	42	Monte	Denesik	DOSS-NWCT-0068	2022-01-10	450	59	140 Glen TremblayMD	DOSS-TBWS-0079	2022-07-12	17568
23	50	Sarahi	Fay	DOSS-INUG-0077	2021-07-11	11526	60	141 Wilfrid Harvey	DOSS-NCKM-0019	2022-11-16	22189
24	51	Dr.	EdgarBaumbachIV	DOSS-TEKO-0088	2021-06-07	26607	60	142 Mrs. LavonneBreitenberg	DOSS-VFYJ-0057	2022-11-13	11625
25	52	Jens	Pacocha	DOSS-RSWU-0040	2022-08-09	17724	61	145 Dr. JadeFraneckilV	DOSS-ZGBV-0095	2022-12-04	8146
26	57	Owens	Hane-Weber	DOSS-OMIO-0050	2021-11-26	19079	62	152 Dr. GiseldaFisherPhD	DOSS-ARES-0064	2022-07-27	30649
27	59	Maybelle	MayerDDS	DOSS-PKVJ-0100	2022-10-27	4860	63	158 Denik Rutherford	DOSS-IUQ-0030	2022-11-25	29571
28	60	Dr.	JerellWeimannJr.	DOSS-YOUR-0062	2022-09-16	36001	64	165 Mrs. GiovannaRobbMD	DOSS-QWMJ-0069	2022-12-26	180
29	62	Miss	LavonHegmannDDS	DOSS-YSAI-0032	2021-09-19	20133	65	168 Kareem Koelpin-Gorcany	DOSS-FZIH-0031	2022-11-11	1638
30	65	Demetric	Auer	DOSS-JMBL-0007	2022-11-27	19419	66	171 Jiles Lehner	DOSS-NLDY-0066	2022-11-25	12025
31	66	Franklin	Mohr-Bartoletti	DOSS-ABPW-0017	2022-11-30	8692	67	178 Gustaf Carter	DOSS-PIUDS-0039	2022-11-28	6961
32	69	Miss	LearnConn	DOSS-RHV-0010	2021-09-03	34945	68	180 Hymer Jacobs	DOSS-RUYW-0048	2022-12-09	16741
33	74	Sasha	Amstrong	DOSS-ISHP-0071	2022-04-11	40084	69	181 Mrs. ItzelBarfellMD	DOSS-IMVX-0094	2023-01-02	5811
34	77	Lee	Schanberger	DOSS-ICRG-0003	2021-07-10	8872	70	182 Addyson Nienow	DOSS-RWML-0008	2022-11-16	28535
35	79	Jovan	O'Keefe-Hermann	DOSS-VGHZ-0092	2022-12-08	29560	71	192 Drew Lesch	DOSS-VKZG-0027	2022-12-24	9392
36	82	Gavin	Rogahn	DOSS-MYYG-0034	2022-09-26	8501	72	195 Kenley Wehner	DOSS-AJFP-0045	2023-01-02	17418

11.

```

proc sql; /* Create a copy of the customers table */
create table project.question11 as
select *
  from project.customers;
quit;

```

```

proc sql; /*Identify customers whose all transactions are below $50 */
create table project.question11_to_delete as
select
  num_client
from (
  /* Compute total amount per transaction */
  select
    c.num_client,
    t.ref,
    sum(p.price * pt.quantity) as transaction_amount
  from project.customers as c
  inner join project.transaction as t
    on c.num_client = t.num_client
  inner join project.products_transaction as pt
    on t.ref = pt.names
  inner join project.products as p
    on p.id = pt.product_id
  group by c.num_client, t.ref
) as per_transaction

```

```

/* Find the highest transaction per customer */
group by num_client
having max(transaction_amount) < 50;
quit;

```

VIEWTABLE: Project.Question11_to_delete	
	num_client

Observation : The table is empty because all the transactions have a total above 50.

```

proc sql; /* Delete identified customers from the copy */
  delete from project.question11
  where num_client in (select num_client from project.question11_to_delete);
quit;

```

	num_client	first	last	age	region	departement	cb_provider	entry_date	fidelity_points	priority
1	1	Solomon	Heaney	53	Lorraine	Meuse	Diners Club / Carte Blanche	2016-05-08 23:51:23	1654	Silver
2	2	Karma	Williamson-Marquardt	81	NA	NA	VISA 13 digit	2018-01-21 00:51:06	3296	Platinum
3	3	Press	Kules	NA	Bretagne	Morbihan	NA	2018-05-13 16:56:08	2267	Silver
4	4	Laken	McDemott	NA	Limousin	Creuse	NA	2018-07-31 08:13:01	2174	Gold
5	5	Syndie	Jaskolski	30	Bretagne	Morbihan	NA	2018-08-02 07:44:08	343	Silver
6	6	Clayton	Ronhoffson	NA	Mid-Pyrénées	Tarn	Diners Club / Carte Blanche	2018-09-22 00:59:52	1335	Silver
7	7	Roberta	Purdy-Wynman	50	Languedoc-Roussillon	Gard	NA	2019-04-02 10:09:23	2193	Silver
8	8	D	RonaldMiller	30	Pyrénées-Caté	Doubs	NA	2019-05-22 10:36:00	3160	Platinum
9	9	Mes	AloindaWiza	18	Mid-Pyrénées	Tarn-et-Garonne	Diners Club / Carte Blanche	2019-07-10 08:37:33	26	Bronze
10	10	Vernice	OndrickaKeebler	19	NA	Somme	NA	2019-07-10 08:50:37	157	Bronze
11	11	Marsel	Schmitz	NA	Pays de la Loire	Loire-Atlantique	NA	2019-10-26 11:46:42	337	Bronze
12	12	Undsey	Hila	60	Limousin	Corrèze	VISA 15 digit	2019-11-04 04:45:51	1612	Silver
13	13	Doyle	Spencer	48	Lorraine	Moselle	Maestro	2019-11-14 15:56:16	1685	Silver
14	14	Duncan	Stokes	68	Basse-Normandie	Manche	NA	2019-12-04 09:49:54	1807	Gold
15	15	Davin	Lowe	NA	Lorraine	Meurthe-et-Moselle	JCB 15 digit	2019-12-15 09:01:46	105	Bronze
16	16	Ulah	Leuschke	28	Champagne-Ardenne	Ardennes	NA	2020-01-11 07:06:59	464	Gold
17	17	Demian	Quigley	70	Lorraine	Meuse	American Express	2020-01-15 12:56:37	2639	Platinum
18	18	Dr.	AbSenger	26	Pays de la Loire	Vendée	NA	2020-02-20 07:05:03	794	Bronze
19	19	Dr.	CasimiroHodkiewiczJr	48	Lorraine	Meurthe-et-Moselle	NA	2020-02-27 19:17:44	1075	Silver
20	20	Dr.	TalanZemkeMD	56	Limousin	Hauts-Vienne	JCB 15 digit	2020-03-26 15:56:28	2807	Platinum
21	21	Mr.	GroverHartmann	22	Poitou-Charentes	Charente-Martime	Mastercard	2020-04-15 11:22:18	615	Bronze
22	22	Theressa	Hemiston	49	Lorraine	Moselle	American Express	2020-04-20 07:16:08	1920	Gold
23	23	Wyman	Fran	NA	Corse	Haute-Corse	Discover	2020-05-06 13:47:54	1286	Gold
24	24	Karan	O'Connell	43	Basse-Normandie	Orne	American Express	2020-05-10 00:00:08	1913	Gold
25	25	Alma	Purdy	20	Mid-Pyrénées	Ariège	NA	2020-05-11 18:17:35	301	Silver
26	26	Treyton	Ziemann	37	Corse	NA	American Express	2020-05-11 00:55:22	786	Bronze
27	27	Dorsey	Murray	30	NA	Gironde	NA	2020-05-22 00:15:01	776	Bronze
28	28	Jayda	Howe	40	Provence-Alpes-Côte d'Azur	Alpes-Maritimes	VISA 16 digit	2020-05-23 00:45:33	1415	Silver
29	29	De	MetzSchamberger	NA	Alsace	Haute-Marne	Diners Club / Carte Blanche	2020-05-24 09:09:14	1943	Gold
30	30	Adbury	Connings	61	Picardie	NA	Mastercard	2020-05-30 13:35:55	235	Gold
31	31	Loren	Lanson	NA	Pays de la Loire	Sarthe	VISA 13 digit	2020-06-21 01:54:46	203	Bronze
32	32	Bennie	Boyer	53	Picardie	Aisne	JCB 16 digit	2020-06-24 16:19:59	855	Bronze
33	33	Lydell	Emser	NA	Champagne-Ardenne	Aube	NA	2020-07-13 16:26:31	346	Silver
34	34	Rowan	Mraz	24	Lorraine	Vosges	NA	2020-07-19 06:05:52	28	Bronze
35	35	Owen	Feeft	18	Haute-Normandie	Seine-Maritime	NA	2020-07-19 07:42:09	126	Bronze
36	36	Mr.	NicholasOm	NA	Provence-Alpes-Côte d'Azur	Hauts-Alpes	NA	2020-07-22 07:55:43	114	Bronze
37	37	Denwin	Kuphal	32	Languedoc-Roussillon	Gard	JCB 15 digit	2020-08-15 00:43:22	1264	Silver
38	38	Belva	JastBrown	NA	Franche-Comté	Haute-Saône	Diners Club / Carte Blanche	2020-08-15 10:58:14	579	Silver
39	39	Wendell	Hettinger	38	Provence-Alpes-Côte d'Azur	Alpes-Maritimes	Mastercard	2020-08-26 00:32:42	952	Silver
40	40	Ms.	LucyLeuschke	25	Champagne-Ardenne	Marne	JCB 15 digit	2020-08-28 16:17:48	803	Bronze
41	41	Chaim	Franeckill	31	Lorraine	Moselle	Discover	2020-09-15 16:25:07	588	Bronze
42	42	Monte	Deneski	51	Lorraine	Moselle	JCB 16 digit	2020-09-17 16:18:55	1338	Bronze
43	43	Natisha	Keeler-Koepf	NA	Provence-Alpes-Côte d'Azur	NA	NA	2020-09-18 01:09:39	1043	Gold
44	44	Mss	FreedaBlick	23	Corse	Corse-du-Sud	Maestro	2020-09-26 04:52:19	410	Bronze
45	45	Vinton	Ryan	46	Picardie	NA	Diners Club / Carte Blanche	2020-10-03 00:45:33	1557	Bronze
46	46	Mr.	LenaBoehm	20	Mid-Pyrénées	Tarn-et-Garonne	VISA 15 digit	2020-10-26 22:00:25	136	Bronze
47	47	Vera	O'Reilly	68	Pays de la Loire	Maine-et-Loire	American Express	2020-10-13 17:31:27	2414	Gold

	num_client	first	last	age	region	departement	cb_provider	entry_date	fidelity_points	priority
154	154	Troyton	Reichert	21	Champagne-Ardenne	Haute-Marne	NA	2022-05-21 20:38:39	562	Silver
155	155	Dr.	ButchSengerDVM	NA	Corse	Haute-Corse	VISA 16 digit	2022-05-23 20:43:37	632	Bronze
156	156	Leonna	Nolan	43	Bretagne	Morbihan	Voyager	2022-05-24 16:54:18	331	Bronze
157	157	Toccara	Weissnat	26	Limousin	Corrèze	NA	2022-06-12 12:59:42	843	Bronze
158	158	Derik	Rutherford	41	Bretagne	Morbihan	Discover	2022-06-13 01:51:23	1739	Silver
159	159	German	Litel	55	Île-de-France	Essonnes	Mastercard	2022-06-16 08:46:03	1097	Bronze
160	160	Mr.	WallaceKochIV	22	Pays de la Loire	Maine-et-Loire	Mastercard	2022-06-18 17:03:42	577	Bronze
161	161	Dr.	FrederickSchoenSr	63	NA	Hauts-de-Seine	Diners Club / Carte Blanche	2022-06-22 00:44:05	1526	Silver
162	162	Leeroy	BeattyV	NA	Pays de la Loire	Mayenne	JCB 16 digit	2022-07-02 18:40:34	31	Bronze
163	163	Vicki	VanderpoolDDS	76	Languedoc-Roussillon	Pyrénées-Orientales	NA	2022-07-05 18:15:45	3205	Gold
164	164	Amoldo	O'HaraMD	32	Bretagne	Morbihan	American Express	2022-07-06 09:24:47	555	Silver
165	165	Ms.	GiovannaRoobMD	60	Île-de-France	Hauts-de-Seine	JCB 16 digit	2022-07-12 08:54:03	1261	Gold
166	166	Wes	Battell	23	Haute-Normandie	Sene-Maritime	NA	2022-07-20 17:58:05	192	Silver
167	167	Maxinilli	Luetge	39	NA	Yvelines	NA	2022-07-22 01:55:38	960	Silver
168	168	Kareem	Koelpin-Gorcanyz	27	Île-de-France	Val-de-Marne	Mastercard	2022-07-23 13:51:41	885	Silver
169	169	Mr.	LaurenSchambenger	53	Pays de la Loire	Vendée	NA	2022-07-23 21:15:51	151	Silver
170	170	Lucius	KushalVII	18	NA	Haute-Vienne	Voyager	2022-07-31 12:49:08	232	Bronze
171	171	Julie	Lehrer	41	Pays de la Loire	NA	American Express	2022-08-01 10:50:20	1671	Silver
172	172	Jerome	Rowe	26	Poitou-Charentes	Deux-Sèvres	Mastercard	2022-08-19 22:25:17	1163	Silver
173	173	Clementin	ChristiansNienow	19	Mid-Pyrénées	Ariège	NA	2022-08-20 02:08:55	173	Bronze
174	174	Dr.	JanetPerevodich	22	Pays de la Loire	Vendée	Diners Club / Carte Blanche	2022-08-26 13:40:37	567	Bronze
175	175	Zhane	Swift	NA	Poitou-Charentes	Charente-Martime	NA	2022-09-23 09:33:20	165	Silver
176	176	Mr.	PatriciaLisonSr	22	Pays de la Loire	Maine-et-Loire	NA	2022-09-16 13:54:18	280	Bronze
177	177	Kesten	LindRutherford	19	Picardie	Oise	NA	2022-09-12 17:00:41	547	Bronze
178	178	Gustaf	Cater	NA	Champagne-Ardenne	Ardennes	Voyager	2022-09-16 06:09:42	614	Bronze
179	179	Dr.	LeonceKautzer	26	Provence-Alpes-Côte d'Azur	Var	Diners Club / Carte Blanche	2022-09-22 01:11:07	344	Bronze
180	180	Hyman	Jacobs	23	Île-de-France	Sainte-Maâne	NA	2022-09-22 02:11:07	157	Bronze
181	181	Mr.	IzelleBartellMD	52	Lorraine	Vosges	Mastercard	2022-09-27 07:26:50	776	Bronze
182	182	Addyson	Nienow	65	Lorraine	Meuse	Maestro	2022-10-09 05:53:15	2379	Gold
183	183	Cheshta	Feil	32	Pays de la Loire	Mayenne	NA	2022-10-18 09:58:00	363	Silver
184	184	Mrs.	ChantalOlsonMD	18	Pays de la Loire	Aude	NA	2022-10-21 12:22:10	153	Bronze
185	185	Dr.	HanselKingsRr	NA	Pays de la Loire	Maine-et-Loire	Maestro	2022-10-23 00:19:30	1200	Silver
186	186	Paris	West	NA	Corse	Haute-Corse	VISA 16 digit	2022-10-23 13:12:11	1881	Gold
187	187	Giancarlo	TillmanIII	40	Pays de la Loire	Hauts-Alpes	NA	2022-10-26 00:07:09	2925	Gold
188	188	Pryor	Labade	23	Île-de-France	Val-de-Marne	JCB 16 digit	2022-10-29 00:08:00	428	Bronze
189	189	Mr.	AktorDorgan	NA	Pays de la Loire	Vendée	NA	2022-10-29 00:49:35	164	Bronze
190	190	Dwayne	Couture	20	Mid-Pyrénées	NA	NA	2022-11-17 10:28:59	537	Platinum
191	191	Mr.	AdielSchamberger	53	Languedoc-Roussillon	Aude	NA	2022-11-20 12:21:12	685	Silver
192	192	Drew	Leach	18	Languedoc-Roussillon	Gard	VISA 14 digit	2022-12-08 09:04:04	120	Bronze
193	193	Madonna	VonRuedenMills	18	Pays de la Loire	Loire-Atlantique	VISA 16 digit	2022-12-09 21:54:06	264	Bronze
194	194	Mr.	KristalladerPhD	NA	Île-de-France	Val-d'Oise	NA	2022-12-12 18:27:15	264	Bronze
195	195	Kenley	Wehner	NA	Languedoc-Roussillon	Aude	Maestro	2022-12-17 18:26:14	502	Bronze
196	196	Gary	Szwarczinski-Huels	NA	Pays de la Loire	Vendée	Mastercard	2022-12-21 13:29:43	185	Bronze
197	197	Agness	VonRuedenSchmeler	33	Champagne-Ardenne	Mame	VISA 16 digit	2023-01-03 13:16:40	333	Bronze
198	198	Adriane	Roob	67	Languedoc-Roussillon	Lozère	Maestro	2023-01-07 03:59:31	2522	Gold
199	199	Mrs.	AnaliaHemiltonDVM	NA	Haute-Normandie	Seine-Maritime	American Express	2023-01-13 04:22:36	649	Silver
200	200	Casey	O'Connell	74	Champagne-Ardenne	Mame	American Express	2023-01-16 23:19:01	2578	Platinum

12.

```
proc sql; /* Keep only purchased products per transaction */
  create table project.q12_products_bought as
  select *
  from project.products_transaction
  where quantity > 0;
quit;
```

	names	product	value	product_id	quantity
1	DOSS-GFEL-0028	prod_X1	6	1	6
2	DOSS-GFEL-0028	prod_X2	14	2	14
3	DOSS-GFEL-0028	prod_X3	33	3	33
4	DOSS-GFEL-0028	prod_X4	4	4	4
5	DOSS-GFEL-0028	prod_X5	76	5	76
6	DOSS-GFEL-0028	prod_X6	46	6	46
7	DOSS-GFEL-0028	prod_X7	22	7	22
8	DOSS-GFEL-0028	prod_X8	11	8	11
9	DOSS-GFEL-0028	prod_X9	9	9	9
10	DOSS-GFEL-0028	prod_X10	47	10	47
11	DOSS-GFEL-0028	prod_X11	20	11	20
12	DOSS-UWYV-0016	prod_X1	6	1	6
13	DOSS-DKFC-0073	prod_X1	73	1	73
14	DOSS-DKFC-0073	prod_X2	38	2	38
15	DOSS-DKFC-0073	prod_X3	61	3	61
16	DOSS-DKFC-0073	prod_X4	2	4	2
17	DOSS-DKFC-0073	prod_X5	15	5	15

```
proc sql; /* Get prices and names */
  create table project.q12_products_bought_details as
  select
    pt.names as transaction_ref,
    p.id as product_id,
    p.name as product_name,
    p.price
  from project.q12_products_bought as pt
  inner join project.products as p
    on pt.product_id = p.id;
quit;
```

	transaction_ref	product_id	product_name	price
1	DOSS-GFEL-0028	1	Step and Distance Pedometer TL Pro	18
2	DOSS-GFEL-0028	2	Biking Tracker U Pro with MP3 Player	35
3	DOSS-GFEL-0028	3	Wearable Transmitter KR	42
4	DOSS-GFEL-0028	4	Multifunction Tracker MG Pro with heart rate sensor	60
5	DOSS-GFEL-0028	5	Action Camera Pro	16
6	DOSS-GFEL-0028	6	Strapless Heart Rate Monitor	23
7	DOSS-GFEL-0028	7	Action Camera RE Pro with Wi-Fi and GPS	69
8	DOSS-GFEL-0028	8	Microcontroller ES	49
9	DOSS-GFEL-0028	9	Microcontroller OGBE with Wi-Fi and GPS	82
10	DOSS-GFEL-0028	10	Wearable AUSG with Calorie Counter	24
11	DOSS-GFEL-0028	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
12	DOSS-UWYV-0016	1	Step and Distance Pedometer TL Pro	18
13	DOSS-DKFC-0073	1	Step and Distance Pedometer TL Pro	18
14	DOSS-DKFC-0073	2	Biking Tracker U Pro with MP3 Player	35

```

proc sql; /*Find cheapest product per transaction*/
create table project.q12_cheapest_products as
select transaction_ref,
product_id as cheapest_product_id,
product_name as cheapest_product_name,
price as cheapest_product_price
from project.q12_products_bought_details as t1
where price = (select min(price)
                from project.q12_products_bought_details as t2
                where t2.transaction_ref = t1.transaction_ref);

quit;

```

VIEWTABLE: Project.Q12_cheapest_products

	transaction_ref	cheapest_product_id	cheapest_product_name	cheapest_product_price
1	DOSS-GFEL-0028	5	Action Camera Pro	16
2	DOSS-UWYV-0016	1	Step and Distance Pedometer TL Pro	18
3	DOSS-DKFC-0073	5	Action Camera Pro	16
4	DOSS-SAYJ-0047	5	Action Camera Pro	16
5	DOSS-GSMZ-0080	5	Action Camera Pro	16
6	DOSS-UIOZ-0085	5	Action Camera Pro	16
7	DOSS-DSMI-0065	5	Action Camera Pro	16
8	DOSS-JOYV-0029	1	Step and Distance Pedometer TL Pro	18
9	DOSS-WPSG-0013	5	Action Camera Pro	16
10	DOSS-NHFG-0036	5	Action Camera Pro	16
11	DOSS-XDEO-0043	5	Action Camera Pro	16
12	DOSS-JGOX-0001	1	Step and Distance Pedometer TL Pro	18
13	DOSS-QZBJ-0082	5	Action Camera Pro	16
14	DOSS-HUPY-0072	1	Step and Distance Pedometer TL Pro	18
15	DOSS-XWJR-0004	1	Step and Distance Pedometer TL Pro	18
16	DOSS-TEKO-0088	5	Action Camera Pro	16
17	DOSS-ICRG-0003	5	Action Camera Pro	16

```

proc sql; /*Find most expensive product per transaction*/
create table project.q12_most_expensive_products as
select transaction_ref,
product_id as most_expensive_product_id,
product_name as most_expensive_product_name,
price as most_expensive_product_price
from project.q12_products_bought_details as t1
where price = (select max(price)
                from project.q12_products_bought_details as t2
                where t2.transaction_ref = t1.transaction_ref);

quit;

```

VIEWTABLE: Project.Q12_most_expensive_products

	transaction_ref	most_expensive_product_id	most_expensive_product_name	most_expensive_product_price
1	DOSS-GFEL-0028	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
2	DOSS-UWYV-0016	1	Step and Distance Pedometer TL Pro	18
3	DOSS-DKFC-0073	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
4	DOSS-SAYJ-0047	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
5	DOSS-GSMZ-0080	9	Microcontroller OGBE with Wi-Fi and GPS	82
6	DOSS-UIOZ-0085	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
7	DOSS-DSMI-0065	9	Microcontroller OGBE with Wi-Fi and GPS	82
8	DOSS-JOYV-0029	4	Multifunction Tracker MG Pro with heart rate sensor	60
9	DOSS-WPSG-0013	9	Microcontroller OGBE with Wi-Fi and GPS	82
10	DOSS-NHFG-0036	11	Biking Tracker V Pro with Activity/Sleep Tracking	98

```

proc sql; /* Select for each transaction the cheapest and the most expensive (in terms
of price) product */
  create table project.question12 as
  select
    c.transaction_ref,
    c.cheapest_product_id,
    c.cheapest_product_name,
    c.cheapest_product_price,
    m.most_expensive_product_id,
    m.most_expensive_product_name,
    m.most_expensive_product_price
  from project.q12_cheapest_products as c
  inner join project.q12_most_expensive_products as m
    on c.transaction_ref = m.transaction_ref;
quit;

```

VIEWTABLE: Project.Question12

	transaction_ref	cheapest_product_id	cheapest_product_name	cheapest_product_price	most_expensive_product_id	most_expensive_product_name	most_expensive_product_price
1	DOSS-GFEL-0028	5	Action Camera Pro	16	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
2	DOSS-UWV-0016		1 Step and Distance Pedometer TL Pro	18	1	Step and Distance Pedometer TL Pro	18
3	DOSS-DKFC-0073	5	Action Camera Pro	16	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
4	DOSS-SAY-0047	5	Action Camera Pro	16	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
5	DOSS-GSMZ-0080	5	Action Camera Pro	16	9	Microcontroller OGBE with Wi-Fi and GPS	82
6	DOSS-IUOZ-0085	5	Action Camera Pro	16	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
7	DOSS-DSM-0065	5	Action Camera Pro	16	9	Microcontroller OGBE with Wi-Fi and GPS	82
8	DOSS-JOY-0029		1 Step and Distance Pedometer TL Pro	18	4	Multifunction Tracker MG Pro with heart rate sensor	60
9	DOSS-WPSG-0013	5	Action Camera Pro	16	9	Microcontroller OGBE with Wi-Fi and GPS	82
10	DOSS-NHFS-0036	5	Action Camera Pro	16	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
11	DOSS-XDED-0043	5	Action Camera Pro	16	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
12	DOSS-GOX-0001		1 Step and Distance Pedometer TL Pro	18	4	Multifunction Tracker MG Pro with heart rate sensor	60
13	DOSS-QZB-0082	5	Action Camera Pro	16	7	Action Camera RE Pro with Wi-Fi and GPS	69
14	DOSS-HIUP-0072		1 Step and Distance Pedometer TL Pro	18	3	Wearable Transmitter KR	42
15	DOSS-XWUR-0004		1 Step and Distance Pedometer TL Pro	18	4	Multifunction Tracker MG Pro with heart rate sensor	60
16	DOSS-TEKO-0088	5	Action Camera Pro	16	11	Biking Tracker V Pro with Activity/Sleep Tracking	98
17	DOSS-ICRG-0003	5	Action Camera Pro	16	4	Multifunction Tracker MG Pro with heart rate sensor	60

13.

```

proc sql;
/* Step 1: Compute total transaction amount per customer */
  create table project.q13_1 as
  select
    t.num_client,
    sum(p.price * pt.quantity) as total_amount
  from project.transaction as t
  inner join project.products_transaction as pt
    on t.ref = pt.names
  inner join project.products as p
    on pt.product_id = p.id
  group by t.num_client;

/* Step 2: Join with customers to get fidelity_points */
  create table project.q13_2 as
  select
    c.num_client,
    c.fidelity_points,
    q131.total_amount
  from project.customers as c
  inner join project.q13_1 as q131
    on c.num_client = q131.num_client;
quit;

```

VIEWTABLE: Project.Q13_1

	num_client	total_amount
1	1	33514
2	2	29568
3	4	29225
4	6	17217
5	8	35792
6	9	21898
7	10	36954
8	12	23043
9	14	17918
10	19	18280
11	22	31086
12	23	3256
13	24	18427
14	29	19241
15	30	22478
16	31	7240
17	32	34518
18	33	20271
19	36	11439
20	37	25860
21	38	16465
22	42	450
23	50	11526

VIEWTABLE: Project.Q13_1

	num_client	total_amount
51	118	41773
52	119	13167
53	120	33241
54	125	43077
55	126	36550
56	127	32282
57	139	14202
58	140	17568
59	141	25807
60	142	41937
61	145	8724
62	152	30649
63	158	54393
64	165	22762
65	168	1638
66	171	29380
67	178	13595
68	180	16741
69	181	5811
70	182	30788
71	192	41114
72	195	17418

Step 2

VIEWTABLE: Project.Q13_2

	num_client	fidelity_points	total_amount
1	1	1654	33514
2	2	3296	29568
3	4	2174	29225
4	6	1336	17217
5	8	318	35792
6	9	26	21898
7	10	157	36954
8	12	1612	23043
9	14	1807	17918
10	19	1075	18280
11	22	1920	31086
12	23	1286	3256
13	24	1913	18427
14	29	1943	19241
15	30	2352	22478
16	31	203	7240
17	32	865	34518
18	33	346	20271
19	36	114	11439
20	37	1264	25860
21	38	579	16465
22	42	1338	450
23	50	338	11526

VIEWTABLE: Project.Q13_2

	num_client	fidelity_points	total_amount
51	118	38	41773
52	119	1855	13167
53	120	1325	33241
54	125	807	43077
55	126	1944	36550
56	127	645	32282
57	139	2064	14202
58	140	124	17568
59	141	1804	25807
60	142	2504	41937
61	145	1704	8724
62	152	692	30649
63	158	1739	54393
64	165	1261	22762
65	168	885	1638
66	171	1672	29380
67	178	614	13595
68	180	157	16741
69	181	776	5811
70	182	2379	30788
71	192	120	41114
72	195	502	17418

```
/* Step 3: Calculate correlation using PROC CORR */
proc corr data=project.q13_2;
  var fidelity_points total_amount;
run;
```

Le Système SAS

La procédure CORR

2 Variables : fidelity_points total_amount

Statistiques simples						
Variable	N	Moyenne	Ec-type	Somme	Minimum	Maximum
fidelity_points	72	1186	806.45370	85403	26.00000	3296
total_amount	72	24010	15490	1728713	450.00000	98469

Coefficients de corrélation de Pearson, N = 72
Proba > |r| sous H0: Rho=0

	fidelity_points	total_amount
fidelity_points	1.00000	0.11420 0.3395
total_amount	0.11420 0.3395	1.00000

14.

```
proc sql;
/* Step 1: Calculate the total for each transaction */
create table project.q14_transaction_totals as
select
    t.ref as transaction_ref,
    month(input(t.timestamp, yymmdd10.)) as month,
    sum(p.price * pt.quantity) as total_amount
from project.transaction t
inner join project.products_transaction pt
    on t.ref = pt.names
inner join project.products p
    on pt.product_id = p.id
group by t.ref, t.timestamp;
quit;
```

VIEWTABLE: Project.Q14_transaction_totals			
	transaction_ref	month	total_amount
1	DOSS-ABPW-0017	11	8692
2	DOSS-AJFP-0045	1	17418
3	DOSS-ARES-0064	7	30649
4	DOSS-ASUL-0009	2	5471
5	DOSS-BDGT-0076	10	27226
6	DOSS-BGKO-0035	9	6634
7	DOSS-CBQJ-0033	8	5373
8	DOSS-CRUE-0051	6	5744
9	DOSS-DKFC-0073	8	21898
10	DOSS-DMIO-0050	11	19079
11	DOSS-DSMI-0065	11	20987
12	DOSS-ECBG-0078	3	16465
13	DOSS-EFKS-0055	12	55431
14	DOSS-FCBH-0083	12	23492
15	DOSS-FJZV-0096	3	29225
16	DOSS-FMLI-0084	12	34251
17	DOSS-FOGD-0037	6	26217
18	DOSS-FYLN-0053	6	39802
19	DOSS-FZIH-0031	11	1638
20	DOSS-GFEL-0028	9	10381
21	DOSS-GKRE-0090	7	14202
22	DOSS-GSMZ-0080	9	22478
23	DOSS-HMYZ-0021	10	40474

VIEWTABLE: Project.Q14_transaction_totals			
	transaction_ref	month	total_amount
79	DOSS-VFYJ-0057	11	11825
80	DOSS-VGHZ-0092	12	29560
81	DOSS-VKZG-0027	12	9392
82	DOSS-VQJM-0069	12	180
83	DOSS-VXEW-0020	1	27770
84	DOSS-WPSG-0013	1	18427
85	DOSS-WYBN-0081	1	13167
86	DOSS-XDEO-0043	1	23133
87	DOSS-XOPB-0054	9	3256
88	DOSS-XSLF-0099	3	1548
89	DOSS-XWJR-0004	4	10600
90	DOSS-XWQV-0015	8	31581
91	DOSS-XYAC-0012	10	19005
92	DOSS-YDNM-0063	6	32282
93	DOSS-YHFC-0087	2	8893
94	DOSS-YPUH-0056	3	15242
95	DOSS-YQR-0062	9	36081
96	DOSS-YSAL-0032	9	20133
97	DOSS-ZGBV-0095	12	8146
98	DOSS-ZLBY-0046	12	12033
99	DOSS-ZPVB-0060	2	17918
100	DOSS-ZPVN-0067	12	2351

```
proc sql;
/* Step 2: Identify the largest transaction for each month */
create table project.q14_max_transaction as
select *
from project.transaction_totals t1
where total_amount =
    select max(total_amount)
        from project.transaction_totals t2
        where t2.month = t1.month
    );
quit;
```

VIEWTABLE: Project.Q14_max_transaction			
	transaction_ref	month	total_amount
1	DOSS-ARES-0064	7	30649
2	DOSS-EFKS-0055	12	55431
3	DOSS-FJZV-0096	3	29225
4	DOSS-FYLN-0053	6	39802
5	DOSS-HMYZ-0021	10	40474
6	DOSS-IJVQ-0030	11	29571
7	DOSS-ISHP-0071	4	40084
8	DOSS-JYQC-0086	2	24312
9	DOSS-MUPB-0002	9	37328
10	DOSS-MXCV-0058	5	22432
11	DOSS-VXEW-0020	1	27770
12	DOSS-XWQV-0015	8	31581

```

proc sql;
/* Step 3: Identify the smallest transaction for each month */
create table project.q14_min_transaction as
select *
from project.transaction_totals t1
where total_amount =
      select min(total_amount)
      from project.transaction_totals t2
      where t2.month = t1.month
);
quit;

```

	transaction_ref	month	total_amount
1	DOSS-ASUL-0009	2	5471
2	DOSS-CBQJ-0033	8	5373
3	DOSS-CRUE-0051	6	5744
4	DOSS-HPNY-0024	11	1440
5	DOSS-IGEN-0041	9	578
6	DOSS-NWCT-0068	1	450
7	DOSS-PKVJ-0100	10	4860
8	DOSS-SIKH-0061	5	4661
9	DOSS-SNUF-0006	4	3618
10	DOSS-UWYV-0016	7	108
11	DOSS-VQJM-0069	12	180
12	DOSS-XSLF-0099	3	1548

```

proc sql; /* Create a table listing all products purchased by month */
create table project.q14_monthly_products as
select
    month(input(t.timestamp, yymmdd10.)) as month,
    p.id as product_id,
    p.name as product_name,
    p.category,
    p.price as product_price,
    pt.quantity,
    pt.names as transaction_ref
from project.transaction t
inner join project.products_transaction pt
    on t.ref = pt.names
inner join project.products p
    on pt.product_id = p.id
where pt.quantity > 0
order by month, p.id;
quit;

```

	month	product_id	product_name	category	product_price	quantity	transaction_ref
1	1	1	Step and Distance Pedometer TL Pro	Industrial	18	30	DOSS-WYBN-0081
2	1	1	Step and Distance Pedometer TL Pro	Industrial	18	87	DOSS-IMVX-0094
3	1	1	Step and Distance Pedometer TL Pro	Industrial	18	86	DOSS-WPSG-0013
4	1	1	Step and Distance Pedometer TL Pro	Industrial	18	51	DOSS-SKLO-0075
5	1	1	Step and Distance Pedometer TL Pro	Industrial	18	46	DOSS-NHFG-0036
6	1	1	Step and Distance Pedometer TL Pro	Industrial	18	24	DOSS-AJFP-0045
7	1	1	Step and Distance Pedometer TL Pro	Industrial	18	47	DOSS-XDEO-0043
8	1	1	Step and Distance Pedometer TL Pro	Industrial	18	72	DOSS-VXEW-0020
9	1	1	Step and Distance Pedometer TL Pro	Industrial	18	25	DOSS-NWCT-0068
10	1	2	Biking Tracker U Pro with MP3 Player	Entertainment	35	60	DOSS-VXEW-0020
11	1	2	Biking Tracker U Pro with MP3 Player	Entertainment	35	26	DOSS-AJFP-0045
12	1	2	Biking Tracker U Pro with MP3 Player	Entertainment	35	90	DOSS-XDEO-0043
13	1	2	Biking Tracker U Pro with MP3 Player	Entertainment	35	51	DOSS-WYBN-0081
14	1	2	Biking Tracker U Pro with MP3 Player	Entertainment	35	41	DOSS-WPSG-0013
15	1	2	Biking Tracker U Pro with MP3 Player	Entertainment	35	12	DOSS-NHFG-0036
16	1	2	Biking Tracker U Pro with MP3 Player	Entertainment	35	6	DOSS-SKLO-0075
17	1	2	Biking Tracker U Pro with MP3 Player	Entertainment	35	35	DOSS-IMVX-0094
18	1	3	Wearable Transmitter KR	Awesome	42	82	DOSS-AJFP-0045
19	1	3	Wearable Transmitter KR	Awesome	42	27	DOSS-XDEO-0043
20	1	3	Wearable Transmitter KR	Awesome	42	53	DOSS-WPSG-0013
21	1	3	Wearable Transmitter KR	Awesome	42	64	DOSS-VXEW-0020
22	1	3	Wearable Transmitter KR	Awesome	42	78	DOSS-WYBN-0081
23	1	3	Wearable Transmitter KR	Awesome	42	92	DOSS-SKLO-0075

```

proc sql;
  create table project.q14_max_product as
  select
    mp.month,
    mp.category
  from project.q14_monthly_products mp
  where mp.product_price = (
    select max(mp2.product_price)
    from project.q14_monthly_products mp2
    where mp2.month = mp.month
  )
  order by month;
quit;

data project.q14_max_product;
  set project.q14_max_product;
  by month;
  if first.month; /* Keep only the first row for each month */
run;

```

VIEWTABLE: Project.Q14_max_product		
	month	category
1	1	Gaming
2	2	Gaming
3	3	Gaming
4	4	Gaming
5	5	Gaming
6	6	Gaming
7	7	Gaming
8	8	Gaming
9	9	Gaming
10	10	Gaming
11	11	Gaming
12	12	Gaming

```

proc sql;
  create table project.question14 as
  select
    max.month,
    max.transaction_ref as max_transaction,
    min.transaction_ref as min_transaction,
    p.category
  from project.q14_max_transaction max
  inner join project.q14_min_transaction min
    on max.month = min.month
  inner join project.Q14_max_product p
    on max.month = p.month
  order by max.month;
quit;

```

	month	max_transaction	min_transaction	category
1	1	DOSS-VXEW-0020	DOSS-NWCT-0068	Gaming
2	2	DOSS-JYQC-0086	DOSS-ASUL-0009	Gaming
3	3	DOSS-FJZV-0096	DOSS-XSLF-0099	Gaming
4	4	DOSS-ISHP-0071	DOSS-SNUF-0006	Gaming
5	5	DOSS-MXCV-0058	DOSS-SIKH-0061	Gaming
6	6	DOSS-FYLN-0053	DOSS-CRUE-0051	Gaming
7	7	DOSS-ARES-0064	DOSS-UWYV-0016	Gaming
8	8	DOSS-XWQV-0015	DOSS-CBQJ-0033	Gaming
9	9	DOSS-MUPB-0002	DOSS-IGEN-0041	Gaming
10	10	DOSS-HMYZ-0021	DOSS-PKVJ-0100	Gaming
11	11	DOSS-IJVQ-0030	DOSS-HPNY-0024	Gaming
12	12	DOSS-EFKS-0055	DOSS-VQJM-0069	Gaming

1.

```
proc sql;
  create table project.question1 as
  select *
  from project.transaction
  where timestamp = (
    select max(timestamp)
    from project.transaction
  );
quit;
```

VIEWTABLE: Project.Question1				
	ref	num_client	timestamp	source_call
1	DOSS-SKLO-0075	87	2023-01-18	Europe
2	DOSS-WYBN-0081	119	2023-01-18	Europe

2.

```
proc sql;
  create table project.question2 as
  select t.ref as transaction_ref,
    t.timestamp,
    c.first as customer_first_name,
    c.last as customer_last_name,
    sum(p.price * pt.quantity) as total_amount
  from project.transaction t
  inner join project.customers c
    on t.num_client = c.num_client
  inner join project.products_transaction pt
    on t.ref = pt.names
  inner join project.products p
    on pt.product_id = p.id
  inner join project.question1 q
    on t.ref=q.ref
  group by t.ref, t.timestamp, c.first, c.last
  order by t.timestamp desc;
quit;
```

VIEWTABLE: Project.Question2					
	transaction_ref	timestamp	customer_first_name	customer_last_name	total_amount
1	DOSS-SKLO-0075	2023-01-18	Jovani	Sipes	14815
2	DOSS-WYBN-0081	2023-01-18	Ammon	Dickens	13167

3.

```
proc sql;
  create table project.q3_day as
  select
    input(timestamp, yymmdd10.) as transaction_date format=ddmmyy10.,
    count(*) as num_transactions
  from project.transaction
  group by calculated transaction_date
  order by transaction_date;
quit;
```

VIEWTABLE: Project.Q3_day		VIEWTABLE: Project.Q3_day	
	transaction_date	num_transactions	
1	28/09/2016	1	47
2	21/07/2020	1	48
3	25/08/2020	1	49
4	08/09/2020	1	50
5	26/09/2020	1	51
6	08/10/2020	1	52
7	05/11/2020	1	53
8	26/12/2020	1	54
9	02/01/2021	1	55
10	19/01/2021	1	56
11	22/01/2021	1	57
12	05/02/2021	1	58
13	12/03/2021	1	59
14	26/03/2021	1	60
15	26/04/2021	1	61
16	07/06/2021	1	62
17	10/07/2021	1	63
18	11/07/2021	1	64
19	17/07/2021	1	65
20	02/08/2021	1	66
21	22/08/2021	1	67
22	03/09/2021	1	68
23	14/09/2021	1	69
24	19/09/2021	1	70
25	26/11/2021	1	71
26	10/12/2021	1	72
27	19/12/2021	1	73
28	23/12/2021	1	74
29	28/12/2021	1	75
30	10/01/2022	1	76
31	31/01/2022	1	77
32	07/02/2022	1	78
33	08/02/2022	1	79
34	14/02/2022	1	80
35	15/02/2022	1	81
36	16/02/2022	1	82
37	18/02/2022	1	83
38	16/03/2022	1	84
39	23/03/2022	2	85
40	26/03/2022	1	86
41	29/03/2022	1	87
42	06/04/2022	1	88
43	11/04/2022	1	89
44	12/04/2022	1	90
45	24/04/2022	1	91
46	10/05/2022	1	92
47	18/05/2022	1	93

```

proc sql;
  create table project.q3_month as
  select
    year(input(timestamp, yymmdd10.)) as year,
    month(input(timestamp, yymmdd10.)) as month,
    count(*) as num_transactions
  from project.transaction
  group by calculated year, calculated month
  order by year, month;
quit;

```

	year	month	num_transactions
1	2016	9	1
2	2020	7	1
3	2020	8	1
4	2020	9	2
5	2020	10	1
6	2020	11	1
7	2020	12	1
8	2021	1	3
9	2021	2	1
10	2021	3	2
11	2021	4	1
12	2021	6	1
13	2021	7	3
14	2021	8	2
15	2021	9	3
16	2021	11	1
17	2021	12	4
18	2022	1	2
19	2022	2	6
20	2022	3	5
21	2022	4	4
22	2022	5	2
23	2022	6	5
24	2022	7	4
25	2022	8	3
26	2022	9	8
27	2022	10	7
28	2022	11	12
29	2022	12	9
30	2023	1	4

```

proc sql;
  create table project.q3_year as
  select
    year(input(timestamp, yymmdd10.)) as year,
    count(*) as num_transactions
  from project.transaction
  group by calculated year
  order by year;
quit;

```

	year	num_transactions
1	2016	1
2	2020	7
3	2021	21
4	2022	67
5	2023	4

```

4.
/* Step 1: Calculate the median of the fidelity_points */
proc sql ;
  select median(fidelity_points) into :med_fp
  from project.customers;
quit;

/* Step 1: Calculate the median of the fidelity_points */
proc sql;
  create table project.question4 as
  select first, last, num_client, fidelity_points
  from project.customers
  where fidelity_points = &med_fp.;
quit;

```



VIEWTABLE: Project.Question4					
	first	last	num_client	fidelity_points	
1	Dorsey	Murray	27	776	
2	Mrs.	ItzelBartellMD	181	776	

5.

```

proc sql;
  create table project.question5 as
  select
    region,
    median(fidelity_points) as median_fidelity_points
  from project.customers
  group by region
  order by median_fidelity_points desc;
quit;

```

	region	median_fidelity_points
1	Basse-Normandie	1860
2	Bourgogne	1593
3	Aquitaine	1404
4	Centre	1314
5	Auvergne	1312
6	Rhône-Alpes	1269
7	Bretagne	1147
8	Nord-Pas-de-Calais	1144
9	Provence-Alpes-Côte d'	1106
10	Lorraine	1075
11	Languedoc-Roussillon	978
12	NA	960
13	Corse	918.5
14	Île-de-France	917.5
15	Limousin	764.5
16	Picardie	653
17	Pays de la Loire	645
18	Franche-Comté	596.5
19	Alsace	590
20	Champagne-Ardenne	499
21	Poitou-Charentes	395
22	Midi-Pyrénées	348
23	Haute-Normandie	192

Observation : There are formatting errors in the region fields. This issue originates from the original data source. We attempted to fix it, but have not succeeded so far.

6.

```

proc sql;
  create table project.question6 as
  select
    a.num_client,
    a.first,
    a.last,
    a.fidelity_points,
    /* Cumulative sum of points up to this customer */
    (select sum(b.fidelity_points)
     from project.customers b
      where b.num_client <= a.num_client) as cumulative_points
  from project.customers a
  order by cumulative_points;
quit;

```

	num_client	first	last	fidelity_points	cumulative_points
1	1	Solomon	Heaney	1654	1654
2	2	Karma	Williamson-Marquardt	3296	4950
3	3	Press	Kulas	2267	7217
4	4	Laken	McDermott	2174	9391
5	5	Syndie	Jaskolski	343	9734
6	6	Clayton	Ronfossen	1336	11070
7	7	Roberta	Purdy-Wyman	2193	13263
8	8	Dr.	RonaldMuller	318	13581
9	9	Miss	AlondraWiza	26	13607
10	10	Venice	Ondricka-Keebler	157	13764
11	11	Marsol	Schmeler	337	14101
12	12	Lindsey	Hills	1612	15713
13	13	Doyle	Spencer	1685	17398
14	14	Duncan	Stokes	1807	19205
15	15	Davin	Love	106	19311
16	16	Lilah	Leuschke	464	19775
17	17	Demian	Quigley	2639	22414
18	18	Dr.	AbSenger	794	23208
19	19	Dr.	CasimiroHodkiewicz Jr.	1075	24283
20	20	Dr.	TalanZiemeMD	2807	27090
21	21	Mr.	GroverHartmann	615	27705
22	22	Theresia	Hemiston	1920	29625
23	23	Wyman	Frami	1286	30911
24	24	Karan	O'Connell	1913	32824
25	25	Alma	Purdy	301	33125
26	26	Treyton	Ziemann	786	33911
27	27	Dorsey	Murray	776	34687
28	28	Jayda	Howe	1415	36102
29	29	Dr.	MetaSchamberger	1943	38045
30	30	Aisbury	Cummings	2352	40397
31	31	Loren	Larson	203	40600
32	32	Bennie	Boyer	865	41465
33	33	Lydell	Emser	346	41811
34	34	Rowan	Mraz	28	41839
35	35	Owen	Feeft	126	41965
36	36	Mr.	NicholasOm	114	42079
37	37	Denwin	Kuphal	1264	43343
38	38	Belva	Jast-Brown	579	43922
39	39	Wendell	Hettinger	952	44874
40	40	Ms.	LucyLeuschke	803	45677
41	41	Chaim	Franeckill	588	46265
42	42	Monte	Denesik	1338	47603
43	43	Natisha	Keebler-Koopp	1043	48646
44	44	Miss	FreedBaick	410	49056
45	45	Vinton	Ryan	1557	50613
46	46	Mr.	LenaBoehm	136	50749
47	47	Vera	O'Reilly	2414	53163

	num_client	first	last	fidelity_points	cumulative_points
154	154	Treyton	Reichert	562	159170
155	155	Dr.	ButchSengerDVM	632	159802
156	156	Leonora	Nolan	331	160133
157	157	Toccara	Weisnat	843	160976
158	158	Derik	Rutherford	1739	162715
159	159	Geman	Litel	1097	163812
160	160	Mr.	WallaceKochIV	677	164489
161	161	Dr.	Fredrick SchoenSr.	1526	166015
162	162	Leeroy	BeattyV	31	166046
163	163	Vicki	VandervortDDS	3205	169251
164	164	Arnoldo	O'HaraMD	555	169806
165	165	Mrs.	GiovannaRoobMD	1261	171067
166	166	Wes	Bartell	192	171259
167	167	Maximilli	Luettgen	960	172219
168	168	Kareem	KoelpinGorcany	885	173104
169	169	Ms.	LaurnSchamberger	1541	174645
170	170	Lucius	KuphalIV	282	174927
171	171	Jiles	Lehner	1672	176599
172	172	Jeremiah	Rowe	1160	177759
173	173	Clementin	ChristiansenNienow	173	177932
174	174	Dr.	JanetPredovicMD	567	178499
175	175	Zhane	Swift	165	178664
176	176	Mr.	PatricLarsonSr.	280	178944
177	177	Kristen	LindRutherford	547	179491
178	178	Gustaf	Carter	614	180105
179	179	Dr.	LeonceKautze	344	180449
180	180	Hymen	Jacobs	157	180606
181	181	Mrs.	ItzelBartellMD	776	181382
182	182	Addyson	Nienow	2379	183761
183	183	Chestina	Feil	363	184124
184	184	Miss	ChantalOlsonMD	153	184277
185	185	Dr.	HanselKeelingSr.	1200	185477
186	186	Paris	West	1881	187358
187	187	Giancarlo	TilmanIII	2052	189410
188	188	Pryor	Labadie	428	189838
189	189	Mr.	AltonDuran	164	190002
190	190	Dwayne	Cronall	537	190539
191	191	Mr.	AdrielSchamberger	685	191224
192	192	Drew	Lesch	120	191344
193	193	Madonna	VonRuedenMills	264	191608
194	194	Mrs.	KristaNaderPhD	264	191872
195	195	Kenley	Wehner	502	192374
196	196	Gary	SwaniawskiHuels	185	192559
197	197	Agness	VonRuedenSchmeler	333	192892
198	198	Adriane	Roob	2522	195414
199	199	Mrs.	AnaliaHerringtonDVM	649	196063
200	200	Casey	O'Connell	2678	198741

7.

```

/* Step 1: Calculate the total amount spent by each customer */
proc sql;
  create table project.q7_total_per_customer as
  select
    c.num_client,
    c.first,
    c.last,
    sum(p.price * pt.quantity) as total_amount
  from project.customers c
  inner join project.transaction t
    on c.num_client = t.num_client
  inner join project.products_transaction pt
    on t.ref = pt.names
  inner join project.products p
    on pt.product_id = p.id
  group by c.num_client, c.first, c.last;
quit;

```

```

/* Step 2: Find the threshold for the top 5% */
proc univariate data=project.q7_total_per_customer noprint;
  var total_amount;
  output out=project.percentile_cutoff pctlpts=95 pctlpre=P_;
run;

/* Step 3: Select customers greater than or equal to the 95th percentile */
proc sql;
  create table project.high_value_customers as
  select *
  from project.q7_total_per_customer
  where total_amount >= (select P_95 from project.percentile_cutoff)
  order by total_amount desc;
quit;

```

VIEWTABLE: Project.High_value_customers

	num_client	first	last	total_amount
1	79	Jovan	O'Keefe-Hemann	98469
2	114	Jennette	Schumm	55431
3	158	Derik	Rutherford	54393
4	103	Coy	Weissnat	46316