Exercise 1

I was created a function which return the *refcursor* with all addresses which satisfy with condition of task

```
CREATE FUNCTION retrieve_addresses_without_cur() RETURNS refcursor AS $$

DECLARE

ref refcursor;

BEGIN

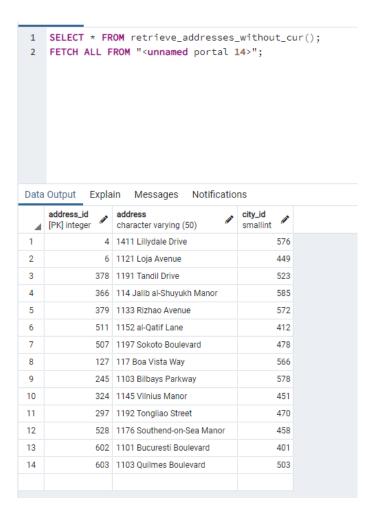
OPEN ref FOR SELECT address_id, address, city_id FROM address WHERE address LIKE '%11%' AND city_id > 399 AND city_id < 601;

RETURN ref;

END

$$ LANGUAGE plpgsql
```

After that I called this function and got such results:



Create the columns by queries in the pdAdmin and create the python script:

```
ALTER TABLE address
ADD COLUMN latitude FLOAT,
ADD COLUMN longitude FLOAT;
```

```
import psycopg2
from geopy.geocoders import Nominatim
con = psycopg2.connect(database="dvdrental", user="postgres",
                      password="VRV175IV**", host="localhost", port="5432")
print("Database opened successfully")
cur = con.cursor()
geolocator = Nominatim(user_agent="I")
my_var = cur.callproc('retrieve_addresses_without_cur')
row = cur.fetchone()
cur.execute(f'FETCH ALL IN "{row[0]}"')
ids = []
for row in cur.fetchall():
ids.append(row[0])
cur.execute("SELECT address_id, address FROM address")
for id, address in cur.fetchall():
       if id not in ids:
           raise Exception
       location = geolocator.geocode(address)
       print((location.latitude, location.longitude))
       cur.execute(f"UPDATE address SET latitude = {location.latitude}, longitude = {location.longitude} WHERE address_id = {id}")
       con.commit()
    except Exception:
       cur.execute(f"UPDATE address SET latitude = 0, longitude = 0 WHERE address_id = {id}")
```

In the result, I got such table:

```
SELECT address, id, address, address2, district, city_id, postal_code, phone, last_update, latitude, longitude
FROM public.address
ORDER BY latitude DESC;
```

4	address_id [PK] integer	address character varying (50)	address2 character varying (50)	district character varying (20)	city_id smallint	postal_code character varying (10)	phone character varying (20)	last_update timestamp without time zone	double precision	longitude double precision
1	324	1145 Vilnius Manor		Mxico	451	73170	674805712553	2022-04-15 17:50:36.894799	54.65967825	24.9437149771127
2	528	1176 Southend-on-Sea Manor		Southern Tagalog	458	81651	236679267178	2022-04-15 17:50:38.409358	51.5364227	0.6900118
3	602	1101 Bucuresti Boulevard		West Greece	401	97661	199514580428	2022-04-15 17:50:39.257273	44.4345383	26.09782154571287
4	4	1411 Lillydale Drive	[null]	QLD	576		6172235589	2022-04-15 17:50:30.98293	36.125749	-82.40084
5	379	1133 Rizhao Avenue		Pernambuco	572	2800	600264533987	2022-04-15 17:50:34.127454	35.092307	119.2624129
6	511	1152 al-Qatif Lane		Kalimantan Barat	412	44816	131370665218	2022-04-15 17:50:34.627779	26.2844342	50.111635
7	40	334 Munger (Monghyr) Lane		Markazi	31	38145	481183273622	2022-04-15 17:50:29.860641	0	(
8	41	1440 Fukuyama Loop		Henan	362	47929	912257250465	2022-04-15 17:50:29.861141	0	(
9	42	269 Cam Ranh Parkway		Chisinau	115	34689	489783829737	2022-04-15 17:50:29.861706	0	(
10	380	1519 Santiago de los Caballeros Loop		East Kasai	348	22025	409315295763	2022-04-15 17:50:29.862206	0	(
11	460	659 Gatineau Boulevard		La Paz	153	28587	205524798287	2022-04-15 17:50:29.862679	0	(
12	195	1077 San Felipe de Puerto Plata Place		Rostov-na-Donu	369	65387	812824036424	2022-04-15 17:50:29.863127	0	(
13	196	9 San Miguel de Tucumn Manor		Uttar Pradesh	169	90845	956188728558	2022-04-15 17:50:29.863562	0	(
14	359	519 Nyeri Manor		So Paulo	461	37650	764680915323	2022-04-15 17:50:29.863979	0	(
15	247	1483 Pathankot Street		Tucumn	454	37288	686015532180	2022-04-15 17:50:29.864389	0	(
16	248	582 Papeete Loop		Central Visayas	294	27722	569868543137	2022-04-15 17:50:29.864802	0	(
17	249	300 Junan Street		Kyonggi	553	81314	890289150158	2022-04-15 17:50:29.865206	0	(
18	250	829 Grand Prairie Way		Paran	328	6461	741070712873	2022-04-15 17:50:29.865737	0	(
19	251	1473 Changhwa Parkway		Mxico	124	75933	266798132374	2022-04-15 17:50:29.866309	0	(
20	252	1309 Weifang Street		Florida	520	57338	435785045362	2022-04-15 17:50:29.866734	0	(
21	253	1760 Oshawa Manor		Tianjin	535	38140	56257502250	20200415175000057140		
22	487	1785 So Bernardo do Campo Street		Veracruz	125	71182	684529463244	✓ Successfully run. Total	query runtime: 77 m	sec. 603 rows affected