

In [2]:

```
#load libraries
import pandas as pd
import numpy as np

%matplotlib inline
import random
import matplotlib.pyplot as plt
```

In [3]:

```
#First, load population files
path = '/Users/michaelshemko/Downloads/'
filename_pop=path + 'pop.csv'
lookup_pop = pd.read_csv(filename_pop)
```

In [4]:

```
lookup_pop.head()
```

Out[4]:

	Country	Admin1	SubDiv	Year	Sex	Frmat	Pop1	Pop2	Pop3	Pop4	..
0	1060	NaN	NaN	1980	1	7	137100.0	3400.0	15800.0	NaN	..
1	1060	NaN	NaN	1980	2	7	159000.0	4000.0	18400.0	NaN	..
2	1125	NaN	NaN	1955	1	2	5051500.0	150300.0	543400.0	NaN	..
3	1125	NaN	NaN	1955	2	2	5049400.0	145200.0	551000.0	NaN	..
4	1125	NaN	NaN	1956	1	2	5353700.0	158700.0	576600.0	NaN	..

5 rows x 33 columns

In [5]:

```
#Next we need the country code file, so that we can identify
#the countries of interest - Iceland, Italy, New Zealand
path = '/Users/michaelshemko/Downloads/'
filename_countries=path + 'country_codes.csv'
lookup_countries = pd.read_csv(filename_countries)
```

In [6]:

```
lookup_countries.head()
```

Out[6]:

	country	name
0	1010	Algeria
1	1020	Angola
2	1025	Benin
3	1030	Botswana
4	1035	Burkina Faso

In [7]:

```
#find Iceland, Italy, New Zealand

countries = ["Iceland", "Italy", "New Zealand"]

lookup_countries.name.isin(countries)

our_countries= lookup_countries[lookup_countries.name.isin(countries)]

our_countries.shape
```

Out[7]:

(3, 2)

In [8]:

```
our_countries
```

Out[8]:

	country	name
174	4160	Iceland
176	4180	Italy
218	5150	New Zealand

In [9]:

```
#so our country codes of interest are 4160, 4180, and 5150
#now, we can use these codes to find the rows in the population file
country_codes = ["4160", "4180", "5150"]

lookup_pop.Country.isin(countries)

country_pop= lookup_pop[lookup_pop.Country.isin(country_codes)]

country_pop.shape
```

Out[9]:

(396, 33)

In [10]:

```
country_pop.head()
```

Out[10]:

	Country	Admin1	SubDiv	Year	Sex	Frmat	Pop1	Pop2	Pop3	Pop4	...
5831	4160	NaN	NaN	1950	1	1	71300.0	2000.0	1900.0	1900.0	...
5832	4160	NaN	NaN	1950	2	1	71300.0	1900.0	1800.0	1800.0	...
5833	4160	NaN	NaN	1951	1	1	72900.0	2000.0	2000.0	1900.0	...
5834	4160	NaN	NaN	1951	2	1	72500.0	1900.0	1800.0	1800.0	...
5835	4160	NaN	NaN	1952	1	1	74200.0	2000.0	2000.0	2000.0	...

5 rows × 33 columns

In [11]:

```
#slicing out only the year of iterest 2010
year_interest = ["2010"]

country_pop.Year.isin(countries)

countries_2010= country_pop[country_pop.Year.isin(year_interest)]

countries_2010.shape
```

Out[11]:

(6, 33)

In [12]:

```
countries_2010
```

Out[12]:

	Country	Admin1	SubDiv	Year	Sex	Frmat	Pop1	Pop2	Pop3	Po
5951	4160	NaN	NaN	2010	1	0	159971.0	2529.0	2483.5	2412
5952	4160	NaN	NaN	2010	2	0	158070.0	2409.0	2380.5	2271
6213	4180	NaN	NaN	2010	1	0	29350339.0	287504.0	292981.0	294030
6214	4180	NaN	NaN	2010	2	0	31133047.0	271675.0	278129.0	279329
9369	5150	NaN	NaN	2010	1	1	2144390.0	32600.0	32650.0	32920
9370	5150	NaN	NaN	2010	2	1	2222970.0	31160.0	30390.0	31120

6 rows × 33 columns

In [13]:

```
#now we can group by country and sum the male and female total  
#population to get the total country population in 2010  
countries_2010.groupby('Country')['Pop1'].sum()
```

Out[13]:

```
Country  
4160      318041.0  
4180    60483386.0  
5150    4367360.0  
Name: Pop1, dtype: float64
```

In [14]:

```
#This gives us the answer to the first question in the assignment  
#total 2010 population for the countries of interest  
#Iceland 318,041  
#Italy 60,483,386  
#New Zealand 4,367,360
```

In [15]:

```
#For deaths, we need to use the individual ICD files, and we are  
#interested in ICD-10, so we use these files  
path = '/Users/michaelshemko/Downloads/'  
filename_icdpart1=path + 'Morticd10_part1.csv'  
lookup_icdpart1 = pd.read_csv(filename_icdpart1)
```

```
/Users/michaelshemko/anaconda/envs/py36/lib/python3.6/site-package  
s/IPython/core/interactiveshell.py:2728: DtypeWarning: Columns (4)  
have mixed types. Specify dtype option on import or set low_memory  
=False.
```

```
interactivity=interactivity, compiler=compiler, result=result)
```

In [16]:

```
lookup_icdpart1.head()
```

Out[16]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Format	IM_Format	Deaths1	...	Deaths2
0	1400	NaN	NaN	2001	101	1000	1	7	8	332	...	1
1	1400	NaN	NaN	2001	101	1000	2	7	8	222	...	1
2	1400	NaN	NaN	2001	101	1001	1	7	8	24	...	1
3	1400	NaN	NaN	2001	101	1001	2	7	8	14	...	1
4	1400	NaN	NaN	2001	101	1002	1	7	8	0	...	1

5 rows × 39 columns

In [17]:

```
#Loading the second icd10 part file
path = '/Users/michaelshemko/Downloads/'
filename_icdpart2=path + 'Morticd10_part2.csv'
lookup_icdpart2 = pd.read_csv(filename_icdpart2)
```

/Users/michaelshemko/anaconda/envs/py36/lib/python3.6/site-packages/IPython/core/interactiveshell.py:2728: DtypeWarning: Columns (2, 4) have mixed types. Specify dtype option on import or set low_memory=False.

```
interactivity=interactivity, compiler=compiler, result=result)
```

In [18]:

```
lookup_icdpart2.head()
```

Out[18]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Format	IM_Format	Deaths1	...	Deaths2
0	1400	NaN	NaN	2005	101	1000	1	7	8	386	...	1
1	1400	NaN	NaN	2005	101	1000	2	7	8	287	...	1
2	1400	NaN	NaN	2005	101	1001	1	7	8	29	...	1
3	1400	NaN	NaN	2005	101	1001	2	7	8	21	...	1
4	1400	NaN	NaN	2005	101	1002	1	7	8	0	...	1

5 rows × 39 columns

In [19]:

```
#Join both parts of the icd file
lookup_bothicd = pd.concat([lookup_icdpart1, lookup_icdpart2])
lookup_bothicd.head()
```

Out[19]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Format	IM_Format	Deaths1	...	Deaths2
0	1400	NaN	NaN	2001	101	1000	1	7	8	332	...	332
1	1400	NaN	NaN	2001	101	1000	2	7	8	222	...	222
2	1400	NaN	NaN	2001	101	1001	1	7	8	24	...	24
3	1400	NaN	NaN	2001	101	1001	2	7	8	14	...	14
4	1400	NaN	NaN	2001	101	1002	1	7	8	0	...	0

5 rows x 39 columns

In [20]:

```
lookup_bothicd.shape
```

Out[20]:

(3704896, 39)

In [21]:

```
#Now we have a large file containing deaths by all causes by all
#years and for all countries
lookup_bothicd.head()
```

Out[21]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Format	IM_Format	Deaths1	...	Deaths2
0	1400	NaN	NaN	2001	101	1000	1	7	8	332	...	332
1	1400	NaN	NaN	2001	101	1000	2	7	8	222	...	222
2	1400	NaN	NaN	2001	101	1001	1	7	8	24	...	24
3	1400	NaN	NaN	2001	101	1001	2	7	8	14	...	14
4	1400	NaN	NaN	2001	101	1002	1	7	8	0	...	0

5 rows x 39 columns

In [22]:

```
#Again, selecting out our countries of interest
country_codes = ["4160", "4180", "5150"]

lookup_bothicd.Country.isin(country_codes)

country_deaths= lookup_bothicd[lookup_bothicd.Country.isin(country_codes)]

country_deaths.shape
```

Out[22]:

(103089, 39)

In [23]:

```
#Now we have our subset of countries
country_deaths.head()
```

Out[23]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
1049428	4160	NaN	NaN	1996	104	A09	1	0	1	1
1049429	4160	NaN	NaN	1996	104	A09	2	0	1	1
1049430	4160	NaN	NaN	1996	104	A390	2	0	1	1
1049431	4160	NaN	NaN	1996	104	A419	1	0	1	2
1049432	4160	NaN	NaN	1996	104	A419	2	0	1	1

5 rows × 39 columns

In [24]:

```
#Selecting out only 2010 now
year_interest = ["2010"]

country_deaths.Year.isin(year_interest)

countries_icd_2010= country_deaths[country_deaths.Year.isin(year_interest)]

countries_icd_2010.shape
```

Out[24]:

(7382, 39)

In [25]:

```
countries_icd_2010.head(15)
```

Out[25]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Format	IM_Format	Deaths1	...
148772	4160	NaN	NaN	2010	103	A04	2	0	1	1	...
148773	4160	NaN	NaN	2010	103	A05	2	0	1	1	...
148774	4160	NaN	NaN	2010	103	A39	1	0	1	1	...
148775	4160	NaN	NaN	2010	103	A41	1	0	1	5	...
148776	4160	NaN	NaN	2010	103	A41	2	0	1	3	...
148777	4160	NaN	NaN	2010	103	AAA	1	0	1	1064	...
148778	4160	NaN	NaN	2010	103	AAA	2	0	1	955	...
148779	4160	NaN	NaN	2010	103	B90	1	0	1	1	...
148780	4160	NaN	NaN	2010	103	B90	2	0	1	1	...
148781	4160	NaN	NaN	2010	103	C00	2	0	1	1	...
148782	4160	NaN	NaN	2010	103	C01	1	0	1	1	...
148783	4160	NaN	NaN	2010	103	C01	2	0	1	1	...
148784	4160	NaN	NaN	2010	103	C02	2	0	1	1	...
148785	4160	NaN	NaN	2010	103	C05	1	0	1	1	...
148786	4160	NaN	NaN	2010	103	C07	2	0	1	1	...

15 rows × 39 columns

In [26]:

```
#Using Deaths1 which is all deaths of all ages, and leaving
#other variables alone, we can sum on Deaths1 by country
countries_icd_2010.groupby('Country')['Deaths1'].sum()
```

Out[26]:

```
Country
4160      4038
4180    1169230
5150     57298
Name: Deaths1, dtype: int64
```

In [27]:

```
#This is a check and corresponds to figures
```


In [28]:

```
#Exploring the data, looking at countries and causes
```

```
countries_icd_2010.groupby(['Country','Cause'])['Deaths1'].sum()
```

Out[28]:

Country	Cause	
4160	A04	1
	A05	1
	A39	1
	A41	8
	AAA	2019
	B90	2
	C00	1
	C01	2
	C02	1
	C05	1
	C07	1
	C09	1
	C15	19
	C16	27
	C17	3
	C18	41
	C20	10
	C21	1
	C22	18
	C24	5
	C25	31
	C26	1
	C31	1
	C32	2
	C34	144
	C38	1
	C40	1
	C41	2
	C43	13
	C44	2
	...	
5150	X910	2
	X951	1
	X952	2
	X953	2
	X959	2
	X970	1
	X990	14
	X999	6
	Y000	6
	Y040	8
	Y070	3
	Y090	5
	Y119	1
	Y129	4
	Y170	1
	Y209	6
	Y212	1
	Y281	1

```
Y309      1
Y312      1
Y471      1
Y600      2
Y606      1
Y655      1
Y850     13
Y859      1
Y86      41
Y870      1
Y871      1
Y899      1
```

Name: Deaths1, Length: 4726, dtype: int64

In [29]:

```
#Transform to a pd dataframe to be sure
pa=pd.DataFrame(countries_icd_2010)
```

In [30]:

```
pa.head( )
```

Out[30]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
148772	4160	NaN	NaN	2010	103	A04	2	0	1	1
148773	4160	NaN	NaN	2010	103	A05	2	0	1	1
148774	4160	NaN	NaN	2010	103	A39	1	0	1	1
148775	4160	NaN	NaN	2010	103	A41	1	0	1	5
148776	4160	NaN	NaN	2010	103	A41	2	0	1	3

5 rows x 11 columns

In [32]:

```
#Now we can select the death age band columns of interest for the next part
array = [ 'Deaths1' ,
'Deaths2' ,
'Deaths3' ,
'Deaths4' ,
'Deaths5' ,
'Deaths6' ,
'Deaths7' ,
'Deaths8' ,
'Deaths9' ,
'Deaths10' ,
'Deaths11' ,
'Deaths12' ,
'Deaths13' ,
'Deaths14' ,
'Deaths15' ,
'Deaths16' ,
'Deaths17' ,
'Deaths18' ,
'Deaths19' ,
'Deaths20' ,
'Deaths21' ,
'Deaths22' ,
'Deaths23' ,
'Deaths24' ]
#pa.loc[pa[ ' ' ]]
```

In [33]:

```
pa.tail()
```

Out[33]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
2296449	5150	NaN	NaN	2010	104	Y86	1	0	1	23
2296450	5150	NaN	NaN	2010	104	Y86	2	0	1	18
2296451	5150	NaN	NaN	2010	104	Y870	2	0	1	1
2296452	5150	NaN	NaN	2010	104	Y871	1	0	1	1
2296453	5150	NaN	NaN	2010	104	Y899	1	0	1	1

5 rows x 11 columns

In [34]:

```
italy_flat = countries_icd_2010[(countries_icd_2010.Country == 4180) & (countries_icd_2010.Year == 2010)]
```

In [35]:

```
italy_flat
```

Out[35] :

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
1675365	4180	NaN	NaN	2010	104	A010	1	0	1	1
1675366	4180	NaN	NaN	2010	104	A020	1	0	1	3
1675367	4180	NaN	NaN	2010	104	A020	2	0	1	1
1675368	4180	NaN	NaN	2010	104	A021	1	0	1	6
1675369	4180	NaN	NaN	2010	104	A021	2	0	1	2
1675370	4180	NaN	NaN	2010	104	A029	1	0	1	1
1675371	4180	NaN	NaN	2010	104	A044	2	0	1	2
1675372	4180	NaN	NaN	2010	104	A045	2	0	1	1
1675373	4180	NaN	NaN	2010	104	A047	1	0	1	87
1675374	4180	NaN	NaN	2010	104	A047	2	0	1	161
1675375	4180	NaN	NaN	2010	104	A048	1	0	1	16
1675376	4180	NaN	NaN	2010	104	A048	2	0	1	29
1675377	4180	NaN	NaN	2010	104	A049	1	0	1	2
1675378	4180	NaN	NaN	2010	104	A049	2	0	1	1
1675379	4180	NaN	NaN	2010	104	A051	1	0	1	1
1675380	4180	NaN	NaN	2010	104	A052	1	0	1	1
1675381	4180	NaN	NaN	2010	104	A058	1	0	1	1
1675382	4180	NaN	NaN	2010	104	A059	1	0	1	1
1675383	4180	NaN	NaN	2010	104	A072	1	0	1	1
1675384	4180	NaN	NaN	2010	104	A080	1	0	1	1
1675385	4180	NaN	NaN	2010	104	A083	2	0	1	1
1675386	4180	NaN	NaN	2010	104	A084	1	0	1	20
1675387	4180	NaN	NaN	2010	104	A084	2	0	1	37
1675388	4180	NaN	NaN	2010	104	A099	1	0	1	10
1675389	4180	NaN	NaN	2010	104	A099	2	0	1	28
1675390	4180	NaN	NaN	2010	104	A162	1	0	1	109
1675391	4180	NaN	NaN	2010	104	A162	2	0	1	52
1675392	4180	NaN	NaN	2010	104	A163	1	0	1	1
1675393	4180	NaN	NaN	2010	104	A164	1	0	1	1
1675394	4180	NaN	NaN	2010	104	A164	2	0	1	1
...
1680305	4180	NaN	NaN	2010	104	Y832	2	0	1	8
1680306	4180	NaN	NaN	2010	104	Y833	1	0	1	5

1680307	4180	NaN	NaN	2010	104	Y833	2	0	1	3
1680308	4180	NaN	NaN	2010	104	Y834	2	0	1	1
1680309	4180	NaN	NaN	2010	104	Y835	1	0	1	21
1680310	4180	NaN	NaN	2010	104	Y835	2	0	1	30
1680311	4180	NaN	NaN	2010	104	Y836	1	0	1	2
1680312	4180	NaN	NaN	2010	104	Y836	2	0	1	2
1680313	4180	NaN	NaN	2010	104	Y838	1	0	1	5
1680314	4180	NaN	NaN	2010	104	Y838	2	0	1	11
1680315	4180	NaN	NaN	2010	104	Y839	1	0	1	54
1680316	4180	NaN	NaN	2010	104	Y839	2	0	1	47
1680317	4180	NaN	NaN	2010	104	Y840	2	0	1	2
1680318	4180	NaN	NaN	2010	104	Y841	1	0	1	1
1680319	4180	NaN	NaN	2010	104	Y844	1	0	1	1
1680320	4180	NaN	NaN	2010	104	Y846	1	0	1	1
1680321	4180	NaN	NaN	2010	104	Y848	1	0	1	2
1680322	4180	NaN	NaN	2010	104	Y848	2	0	1	2
1680323	4180	NaN	NaN	2010	104	Y850	1	0	1	11
1680324	4180	NaN	NaN	2010	104	Y850	2	0	1	3
1680325	4180	NaN	NaN	2010	104	Y859	1	0	1	6
1680326	4180	NaN	NaN	2010	104	Y859	2	0	1	1
1680327	4180	NaN	NaN	2010	104	Y86	1	0	1	360
1680328	4180	NaN	NaN	2010	104	Y86	2	0	1	832
1680329	4180	NaN	NaN	2010	104	Y870	1	0	1	2
1680330	4180	NaN	NaN	2010	104	Y871	1	0	1	1
1680331	4180	NaN	NaN	2010	104	Y871	2	0	1	1
1680332	4180	NaN	NaN	2010	104	Y872	1	0	1	3
1680333	4180	NaN	NaN	2010	104	Y883	1	0	1	9
1680334	4180	NaN	NaN	2010	104	Y883	2	0	1	17

In [36]:

```
countries_icd_2010.dtypes
```

Out[36]:

```
Country          int64
Admin1           float64
SubDiv           object
Year            int64
List            object
Cause           object
Sex             int64
Frmate          int64
IM_Frmate        int64
Deaths1         int64
Deaths2         float64
Deaths3         float64
Deaths4         float64
Deaths5         float64
Deaths6         float64
Deaths7         float64
Deaths8         float64
Deaths9         float64
Deaths10        float64
Deaths11        float64
Deaths12        float64
Deaths13        float64
Deaths14        float64
Deaths15        float64
Deaths16        float64
Deaths17        float64
Deaths18        float64
Deaths19        float64
Deaths20        float64
Deaths21        float64
Deaths22        float64
Deaths23        float64
Deaths24        float64
Deaths25        float64
Deaths26        float64
IM_Deaths1      float64
IM_Deaths2      float64
IM_Deaths3      float64
IM_Deaths4      float64
dtype: object
```

In [37]:

```
#Selecting the age bands we are interested in and summing each
italy_dist = italy_flat.groupby(['Country'])['Deaths2','Deaths3','Deaths4','Deaths5','Deaths6','Deaths7','Deaths8','Deaths9','Deaths10','Deaths11','Deaths12','Deaths13','Deaths14','Deaths15','Deaths16','Deaths17','Deaths18','Deaths19','Deaths20','Deaths21','Deaths22','Deaths23','Deaths24','Deaths25','Deaths26'].sum()
```

In [38]:

```
italy_dist
```

Out[38]:

	Deaths2	Deaths3	Deaths4	Deaths5	Deaths6	Deaths7	Deaths8	Deaths9	Deat
Country									
4180	3726.0	248.0	158.0	158.0	122.0	456.0	584.0	1642.0	23

1 rows x 25 columns

In [39]:

```
italy_dist['<10'] = italy_dist['Deaths2'] + italy_dist['Deaths3'] + italy_dist
['Deaths4'] + italy_dist['Deaths5'] + italy_dist['Deaths6'] + italy_dist['Deat
hs7']
italy_dist['10-19'] = italy_dist['Deaths8'] + italy_dist['Deaths9']
italy_dist['20-29'] = italy_dist['Deaths10'] + italy_dist['Deaths11']
italy_dist['30-39'] = italy_dist['Deaths12'] + italy_dist['Deaths13']
italy_dist['40-49'] = italy_dist['Deaths14'] + italy_dist['Deaths15']
italy_dist['50-59'] = italy_dist['Deaths16'] + italy_dist['Deaths17']
italy_dist['60 and over'] = italy_dist['Deaths18'] + italy_dist['Deaths19'] +
italy_dist['Deaths20'] + italy_dist['Deaths21'] + italy_dist['Deaths22'] + ita
ly_dist['Deaths23'] + italy_dist['Deaths24'] + italy_dist['Deaths25'] + italy_
dist['Deaths26']
```

In [40]:

```
italy_dist
```

Out[40]:

	Deaths2	Deaths3	Deaths4	Deaths5	Deaths6	Deaths7	Deaths8	Deaths9	De
Country									
4180	3726.0	248.0	158.0	158.0	122.0	456.0	584.0	1642.0	

1 rows x 32 columns

In [41]:

```
italy_bands = italy_dist[['<10', '10-19', '20-29', '30-39', '40-49', '50-59', '60 a
nd over']]
```

In [42]:

```
italy_bands
```

Out[42]:

	<10	10-19	20-29	30-39	40-49	50-59	60 and over	
Country	4180	4868.0	2226.0	5132.0	10354.0	26068.0	54078.0	1066504.0

In [43]:

```
# x-coordinates of left sides of bars
left = [1, 2, 3, 4, 5, 6, 7]

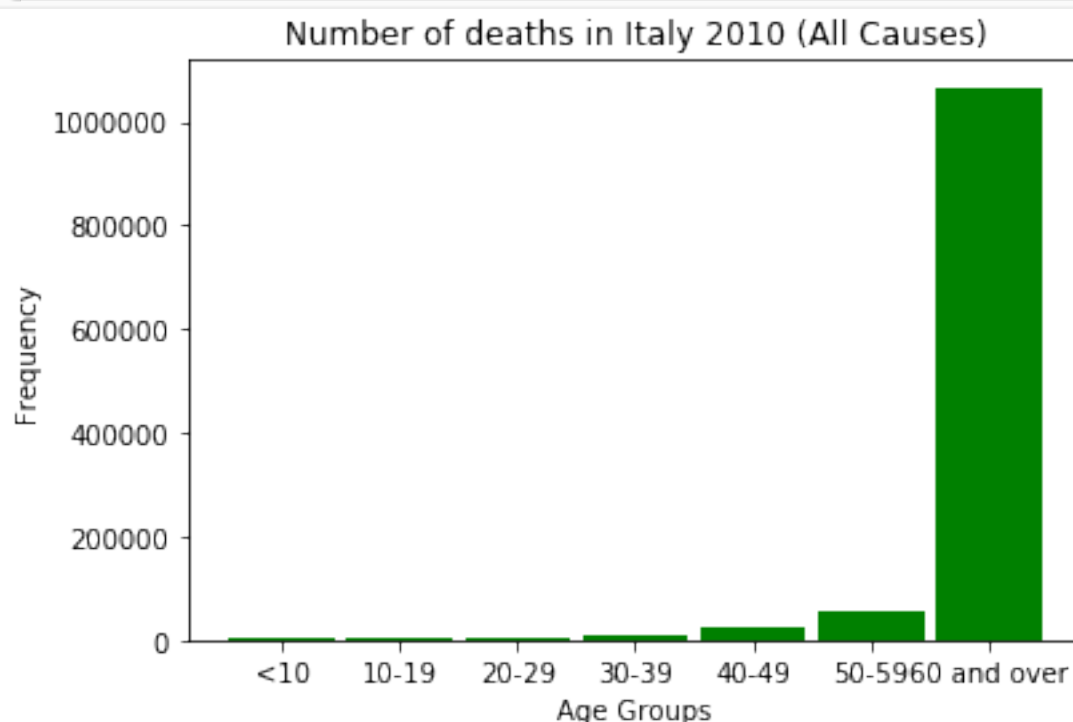
# heights of bars
height = [4868, 2226, 5132, 10354, 26068, 54078, 1066504]

# labels for bars
tick_label = ['<10', '10-19', '20-29', '30-39', '40-49', '50-59', '60 and over']

# plotting a bar chart
plt.bar(left, height, tick_label = tick_label,
        width = 0.90, color = ['green'])

# naming the x-axis
plt.xlabel('Age Groups')
# naming the y-axis
plt.ylabel('Frequency')
# plot title
plt.title('Number of deaths in Italy 2010 (All Causes)')

# function to show the plot
plt.show()
```



In [88]:

```
#What were the top five causes of death (top five ICD-10 terms) in Italy across all  
#years for the Neoplasm ICD10-category (C00-D48)?  
#o Generate a table with the cause of death, the number of deaths, and the  
#proportion of overall deaths.  
#o Generate a pie chart to visualize the proportion of deaths.
```

In [45]:

```
icd_codes1 = italy_flat[(italy_flat.Cause >= 'C00') & (italy_flat.Cause <= 'C97')]
```

In [46]:

```
icd_codes1
```

Out[46]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
1675657	4180	NaN	NaN	2010	104	C000	1	0	1	3
1675658	4180	NaN	NaN	2010	104	C000	2	0	1	4
1675659	4180	NaN	NaN	2010	104	C001	1	0	1	17
1675660	4180	NaN	NaN	2010	104	C001	2	0	1	10
1675661	4180	NaN	NaN	2010	104	C006	1	0	1	1
1675662	4180	NaN	NaN	2010	104	C009	1	0	1	18
1675663	4180	NaN	NaN	2010	104	C009	2	0	1	13
1675664	4180	NaN	NaN	2010	104	C01	1	0	1	76
1675665	4180	NaN	NaN	2010	104	C01	2	0	1	19
1675666	4180	NaN	NaN	2010	104	C021	1	0	1	3
1675667	4180	NaN	NaN	2010	104	C022	1	0	1	1
1675668	4180	NaN	NaN	2010	104	C023	1	0	1	1
1675669	4180	NaN	NaN	2010	104	C024	1	0	1	1
1675670	4180	NaN	NaN	2010	104	C029	1	0	1	279
1675671	4180	NaN	NaN	2010	104	C029	2	0	1	176
1675672	4180	NaN	NaN	2010	104	C030	1	0	1	7
1675673	4180	NaN	NaN	2010	104	C030	2	0	1	7
1675674	4180	NaN	NaN	2010	104	C031	1	0	1	2
1675675	4180	NaN	NaN	2010	104	C031	2	0	1	1
1675676	4180	NaN	NaN	2010	104	C039	1	0	1	8
1675677	4180	NaN	NaN	2010	104	C039	2	0	1	7
1675678	4180	NaN	NaN	2010	104	C040	1	0	1	1

1675679	4180	NaN	NaN	2010	104	C049	1	0	1	32
1675680	4180	NaN	NaN	2010	104	C049	2	0	1	10
1675681	4180	NaN	NaN	2010	104	C050	1	0	1	6
1675682	4180	NaN	NaN	2010	104	C050	2	0	1	5
1675683	4180	NaN	NaN	2010	104	C051	1	0	1	15
1675684	4180	NaN	NaN	2010	104	C051	2	0	1	8
1675685	4180	NaN	NaN	2010	104	C052	1	0	1	3
1675686	4180	NaN	NaN	2010	104	C052	2	0	1	1
...
1676238	4180	NaN	NaN	2010	104	C929	1	0	1	107
1676239	4180	NaN	NaN	2010	104	C929	2	0	1	70
1676240	4180	NaN	NaN	2010	104	C930	1	0	1	8
1676241	4180	NaN	NaN	2010	104	C930	2	0	1	5
1676242	4180	NaN	NaN	2010	104	C931	1	0	1	4
1676243	4180	NaN	NaN	2010	104	C931	2	0	1	5
1676244	4180	NaN	NaN	2010	104	C939	1	0	1	5
1676245	4180	NaN	NaN	2010	104	C939	2	0	1	3
1676246	4180	NaN	NaN	2010	104	C940	1	0	1	1
1676247	4180	NaN	NaN	2010	104	C940	2	0	1	1
1676248	4180	NaN	NaN	2010	104	C944	1	0	1	3
1676249	4180	NaN	NaN	2010	104	C944	2	0	1	1
1676250	4180	NaN	NaN	2010	104	C947	1	0	1	1
1676251	4180	NaN	NaN	2010	104	C947	2	0	1	3
1676252	4180	NaN	NaN	2010	104	C950	1	0	1	305
1676253	4180	NaN	NaN	2010	104	C950	2	0	1	336
1676254	4180	NaN	NaN	2010	104	C951	1	0	1	39
1676255	4180	NaN	NaN	2010	104	C951	2	0	1	37
1676256	4180	NaN	NaN	2010	104	C959	1	0	1	199
1676257	4180	NaN	NaN	2010	104	C959	2	0	1	170
1676258	4180	NaN	NaN	2010	104	C960	2	0	1	1
1676259	4180	NaN	NaN	2010	104	C962	2	0	1	2
1676260	4180	NaN	NaN	2010	104	C966	1	0	1	2
1676261	4180	NaN	NaN	2010	104	C966	2	0	1	1
1676262	4180	NaN	NaN	2010	104	C967	1	0	1	26
1676263	4180	NaN	NaN	2010	104	C967	2	0	1	17
1676264	4180	NaN	NaN	2010	104	C968	1	0	1	1

1676265	4180	NaN	NaN	2010	104	C968	2	0	1	1
1676266	4180	NaN	NaN	2010	104	C969	1	0	1	40
1676267	4180	NaN	NaN	2010	104	C969	2	0	1	55

611 rows x 30 columns

In [47]:

```
icd_codes1.groupby( 'Cause' )[ 'Deaths1' ].sum( )
```

Out[47]:

Cause	
C000	7
C001	27
C006	1
C009	31
C01	95
C021	3
C022	1
C023	1
C024	1
C029	455
C030	14
C031	3
C039	15
C040	1
C049	42
C050	11
C051	23
C052	4
C059	36
C060	5
C061	1
C062	13
C068	3
C069	492
C07	243
C080	16
C081	1
C089	53
C090	3
C091	1
...	
C910	355
C911	1317
C913	14
C914	32
C915	12
C917	1
C919	105
C920	2067
C921	421
C922	1
C923	5
C924	46
C925	27

```
C925      87
C927      82
C929     177
C930      13
C931       9
C939       8
C940       2
C944       4
C947       4
C950     641
C951      76
C959     369
C960       1
C962       2
C966       3
C967      43
C968       2
C969      95
Name: Deaths1, Length: 346, dtype: int64
```

In [48]:

```
icd_codes2 = italy_flat[(italy_flat.Cause >= 'D00') & (italy_flat.Cause <= 'D48')]
```

In [49]:

```
icd_codes2.groupby('Cause')['Deaths1'].sum()
```

Out[49]:

```
Cause
D049      1
D075      1
D125      1
D126     30
D130      1
D131      3
D134      7
D136      2
D137      3
D143      2
D150     22
D151     10
D152      1
D160      1
D164      1
D165      1
D171      1
D172      1
D179      1
D180     28
D181     32
D213      1
D24       1
D259      6
D27       4
D303      5
```

```
D320      299
D321       4
D329     230
D330       2
...
D414     912
D417       1
D419       2
D421       1
D429       8
D430    1307
D431       37
D432       56
D433        1
D434        3
D437        2
D439        2
D440       27
D441       11
D443        9
D444       20
D445        4
D446        1
D448        1
D449        5
D45      105
D462       29
D464       95
D467        9
D469    1192
D471     530
D472     177
D473       73
D477        4
D479     154
Name: Deaths1, Length: 94, dtype: int64
```

In [93]:

```
icd_codes1
```

Out[93]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
1675657	4180	NaN	NaN	2010	104	C000	1	0	1	3
1675658	4180	NaN	NaN	2010	104	C000	2	0	1	4
1675659	4180	NaN	NaN	2010	104	C001	1	0	1	17
1675660	4180	NaN	NaN	2010	104	C001	2	0	1	10
1675661	4180	NaN	NaN	2010	104	C006	1	0	1	1
1675662	4180	NaN	NaN	2010	104	C009	1	0	1	18
1675663	4180	NaN	NaN	2010	104	C009	2	0	1	13

1675664	4180	NaN	NaN	2010	104	C01	1	0	1	76
1675665	4180	NaN	NaN	2010	104	C01	2	0	1	19
1675666	4180	NaN	NaN	2010	104	C021	1	0	1	3
1675667	4180	NaN	NaN	2010	104	C022	1	0	1	1
1675668	4180	NaN	NaN	2010	104	C023	1	0	1	1
1675669	4180	NaN	NaN	2010	104	C024	1	0	1	1
1675670	4180	NaN	NaN	2010	104	C029	1	0	1	279
1675671	4180	NaN	NaN	2010	104	C029	2	0	1	176
1675672	4180	NaN	NaN	2010	104	C030	1	0	1	7
1675673	4180	NaN	NaN	2010	104	C030	2	0	1	7
1675674	4180	NaN	NaN	2010	104	C031	1	0	1	2
1675675	4180	NaN	NaN	2010	104	C031	2	0	1	1
1675676	4180	NaN	NaN	2010	104	C039	1	0	1	8
1675677	4180	NaN	NaN	2010	104	C039	2	0	1	7
1675678	4180	NaN	NaN	2010	104	C040	1	0	1	1
1675679	4180	NaN	NaN	2010	104	C049	1	0	1	32
1675680	4180	NaN	NaN	2010	104	C049	2	0	1	10
1675681	4180	NaN	NaN	2010	104	C050	1	0	1	6
1675682	4180	NaN	NaN	2010	104	C050	2	0	1	5
1675683	4180	NaN	NaN	2010	104	C051	1	0	1	15
1675684	4180	NaN	NaN	2010	104	C051	2	0	1	8
1675685	4180	NaN	NaN	2010	104	C052	1	0	1	3
1675686	4180	NaN	NaN	2010	104	C052	2	0	1	1
...
1676238	4180	NaN	NaN	2010	104	C929	1	0	1	107
1676239	4180	NaN	NaN	2010	104	C929	2	0	1	70
1676240	4180	NaN	NaN	2010	104	C930	1	0	1	8
1676241	4180	NaN	NaN	2010	104	C930	2	0	1	5
1676242	4180	NaN	NaN	2010	104	C931	1	0	1	4
1676243	4180	NaN	NaN	2010	104	C931	2	0	1	5
1676244	4180	NaN	NaN	2010	104	C939	1	0	1	5
1676245	4180	NaN	NaN	2010	104	C939	2	0	1	3
1676246	4180	NaN	NaN	2010	104	C940	1	0	1	1
1676247	4180	NaN	NaN	2010	104	C940	2	0	1	1
1676248	4180	NaN	NaN	2010	104	C944	1	0	1	3
1676249	4180	NaN	NaN	2010	104	C944	2	0	1	1

1676250	4180	NaN	NaN	2010	104	C947	1	0	1	1
1676251	4180	NaN	NaN	2010	104	C947	2	0	1	3
1676252	4180	NaN	NaN	2010	104	C950	1	0	1	305
1676253	4180	NaN	NaN	2010	104	C950	2	0	1	336
1676254	4180	NaN	NaN	2010	104	C951	1	0	1	39
1676255	4180	NaN	NaN	2010	104	C951	2	0	1	37
1676256	4180	NaN	NaN	2010	104	C959	1	0	1	199
1676257	4180	NaN	NaN	2010	104	C959	2	0	1	170
1676258	4180	NaN	NaN	2010	104	C960	2	0	1	1
1676259	4180	NaN	NaN	2010	104	C962	2	0	1	2
1676260	4180	NaN	NaN	2010	104	C966	1	0	1	2
1676261	4180	NaN	NaN	2010	104	C966	2	0	1	1
1676262	4180	NaN	NaN	2010	104	C967	1	0	1	26
1676263	4180	NaN	NaN	2010	104	C967	2	0	1	17
1676264	4180	NaN	NaN	2010	104	C968	1	0	1	1
1676265	4180	NaN	NaN	2010	104	C968	2	0	1	1
1676266	4180	NaN	NaN	2010	104	C969	1	0	1	40
1676267	4180	NaN	NaN	2010	104	C969	2	0	1	55

611 rows x 39 columns

In [96]:

```
#realised i made a mistake and was analysing only 2010 data, but the question asks for all years
#so back to square one

country_codes = ["4180"]

lookup_bothicd.Country.isin(country_codes)

country_deaths= lookup_bothicd[lookup_bothicd.Country.isin(country_codes)]

country_deaths.shape
```

Out[96]:

(63356, 39)

In [100]:

```
italy_neoplasms1 = country_deaths[(country_deaths.Cause >= 'C00') & (country_deaths.Cause <= 'C97')]
```

In [103]:

```
italy_neoplasms1.head()
```

Out[103]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1	...
1053596	4180	NaN	NaN	2003	104	C000	1	0	1	2	...
1053597	4180	NaN	NaN	2003	104	C000	2	0	1	7	...
1053598	4180	NaN	NaN	2003	104	C001	1	0	1	21	...
1053599	4180	NaN	NaN	2003	104	C001	2	0	1	5	...
1053600	4180	NaN	NaN	2003	104	C009	1	0	1	24	...

5 rows x 39 columns

In [104]:

```
italy_neoplasms2 = country_deaths[(country_deaths.Cause >= 'D00') & (country_deaths.Cause <= 'D48')]
```

In [106]:

```
italy_neoplasms2.head()
```

Out[106]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
1054207	4180	NaN	NaN	2003	104	D042	1	0	1	1
1054208	4180	NaN	NaN	2003	104	D051	2	0	1	3
1054209	4180	NaN	NaN	2003	104	D103	2	0	1	1
1054210	4180	NaN	NaN	2003	104	D110	1	0	1	1
1054211	4180	NaN	NaN	2003	104	D119	2	0	1	1

5 rows x 39 columns

In [107]:

```
df = italy_neoplasms1

df2 = italy_neoplasms2

total_italy_neoplasms = df.append(df2)
```


In [108]:

```
total_italy_neoplasms.head()
```

Out[108]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1	...
1053596	4180	NaN	NaN	2003	104	C000	1	0	1	2	...
1053597	4180	NaN	NaN	2003	104	C000	2	0	1	7	...
1053598	4180	NaN	NaN	2003	104	C001	1	0	1	21	...
1053599	4180	NaN	NaN	2003	104	C001	2	0	1	5	...
1053600	4180	NaN	NaN	2003	104	C009	1	0	1	24	...

5 rows × 39 columns

In [118]:

```
group1 = total_italy_neoplasms.groupby('Cause')['Deaths1'].sum()
```

In [119]:

```
group1.head(5)
```

Out[119]:

```
Cause
C000      68
C001     355
C002       1
C004       1
C005       2
Name: Deaths1, dtype: int64
```

In [129]:

```
indexed1 = group1.to_frame(name = 'count').reset_index()
```

In [130]:

```
indexed1.head(5)
```

Out[130]:

	Cause	count
0	C000	68
1	C001	355
2	C002	1
3	C004	1
4	C005	2

In [132]:

```
type(indexed1)
```

Out[132]:

```
pandas.core.frame.DataFrame
```

In [134]:

```
sorted1 = indexed1.sort_values(by=[ 'count' ], ascending=False)
```

In [135]:

```
#this gives us the top 10 causes of death in italy  
#across all years, where we can get our answer top 5  
sorted1.head(10)
```

Out[135]:

	Cause	count
143	C349	426451
227	C509	155895
92	C189	143188
76	C169	125679
118	C259	120070
259	C61	95906
280	C679	71097
105	C229	58342
99	C220	54393
360	C809	54152

In [138]:

```
grand_total_deaths = sorted1['count'].sum()
```

In [139]:

```
grand_total_deaths
```

Out[139]:

2239541

In [140]:

```
#to check this figure, we can sum up all deaths from the  
#original icd death file, total_italy_neoplasms  
check_italy_deaths = total_italy_neoplasms['Deaths1'].sum()
```

In [141]:

```
#we see that the figures match  
check_italy_deaths
```

Out[141]:

2239541

In [142]:

```
#now we can add a calculated column with the proportion  
#of deaths  
sorted1['proportion'] = sorted1['count']/2239541
```

In [146]:

```
sorted1
```

Out[146]:

	Cause	count	proportion
143	C349	426451	1.904189e-01
227	C509	155895	6.961025e-02
92	C189	143188	6.393632e-02
76	C169	125679	5.611820e-02
118	C259	120070	5.361366e-02
259	C61	95906	4.282395e-02
280	C679	71097	3.174624e-02
105	C229	58342	2.605087e-02
99	C220	54393	2.428757e-02
360	C809	54152	2.417995e-02

389	C859	48344	2.158657e-02
268	C64	41962	1.873688e-02
94	C20	41199	1.839618e-02
245	C56	41196	1.839484e-02
394	C900	37688	1.682845e-02
359	C80	33186	1.481821e-02
119	C260	30638	1.368048e-02
405	C920	26392	1.178456e-02
67	C159	22888	1.021995e-02
244	C55	22585	1.008466e-02
296	C710	21782	9.726100e-03
136	C329	20212	9.025064e-03
437	C97	19922	8.895573e-03
110	C249	19499	8.706695e-03
305	C719	18906	8.441908e-03
90	C187	18621	8.314650e-03
582	D430	17441	7.787757e-03
176	C439	17279	7.715420e-03
398	C911	16953	7.569855e-03
106	C23	15763	7.038496e-03
...
210	C488	1	4.465201e-07
222	C502	1	4.465201e-07
469	D140	1	4.465201e-07
456	D120	1	4.465201e-07
482	D167	1	4.465201e-07
262	C630	1	4.465201e-07
453	D109	1	4.465201e-07
452	D106	1	4.465201e-07
450	D099	1	4.465201e-07
543	D359	1	4.465201e-07
563	D386	1	4.465201e-07
449	D090	1	4.465201e-07
448	D075	1	4.465201e-07
248	C572	1	4.465201e-07
444	D048	1	4.465201e-07
446	D063	1	4.465201e-07

443	D042	1	4.465201e-07
483	D168	1	4.465201e-07
441	D024	1	4.465201e-07
224	C505	1	4.465201e-07
440	D015	1	4.465201e-07
485	D170	1	4.465201e-07
432	C963	1	4.465201e-07
429	C960	1	4.465201e-07
538	D339	1	4.465201e-07
459	D127	1	4.465201e-07
257	C608	1	4.465201e-07
477	D161	1	4.465201e-07
494	D199	1	4.465201e-07
260	C620	1	4.465201e-07
495	D200	1	4.465201e-07

611 rows × 3 columns

In [145]:

```

proportion_check = sorted1[ 'proportion' ].sum()
proportion_check

```

Out[145]:

1.0

In [147]:

```

#this gives us the required table
sorted1.head(5)

```

Out[147]:

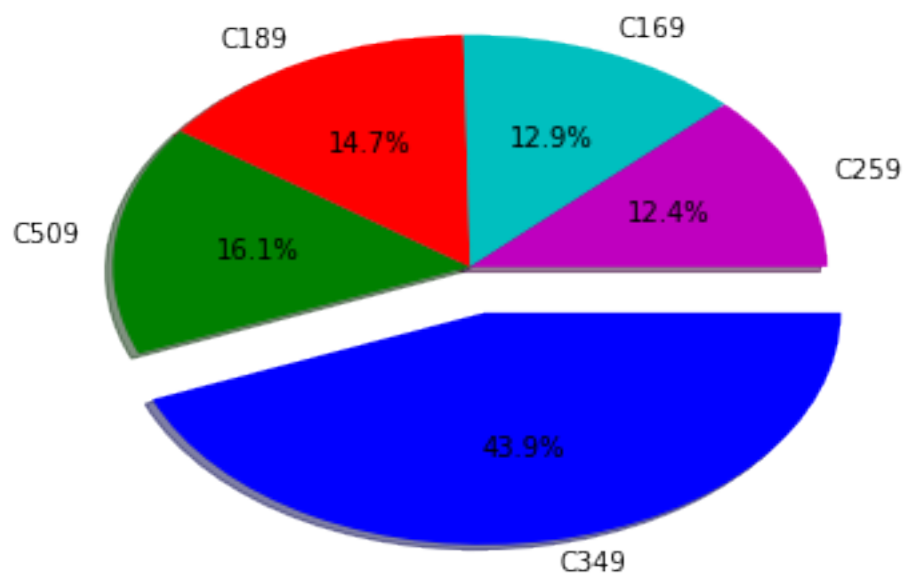
	Cause	count	proportion
143	C349	426451	0.190419
227	C509	155895	0.069610
92	C189	143188	0.063936
76	C169	125679	0.056118
118	C259	120070	0.053614

In [150]:

```
import matplotlib.pyplot as plt

values = [426451, 155895, 143188, 125679, 120070]
colors = ['b', 'g', 'r', 'c', 'm']
labels = ['C349', 'C509', 'C189', 'C169', 'C259']
explode = (0.2, 0, 0, 0, 0)
plt.pie(values, colors=colors, labels=labels,
explode=explode, autopct='%1.1f%%',
counterclock=False, shadow=True)
plt.title('Top 5 Causes of Death for Neoplasms [ICD-10] in Italy (All Causes and years)')
plt.show()
```

Top 5 Causes of Death for Neoplasms [ICD-10] in Italy (All Causes and years)

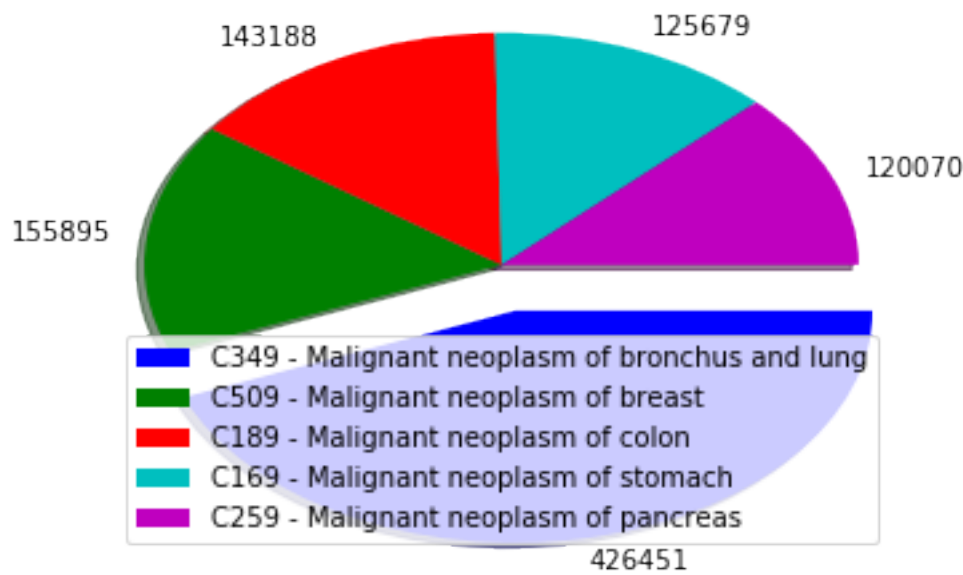


In [162]:

```
import matplotlib.pyplot as plt

values = [426451, 155895, 143188, 125679, 120070]
colors = ['b', 'g', 'r', 'c', 'm']
labels = ['C349 - Malignant neoplasm of bronchus and lung', 'C509 - Malignant neoplasm of breast', 'C189 - Malignant neoplasm of colon', 'C169 - Malignant neoplasm of stomach', 'C259 - Malignant neoplasm of pancreas']
#labels = ['C349', 'C509', 'C189', 'C169', 'C259']
explode = (0.2, 0, 0, 0, 0)
plt.pie(values, colors=colors, labels= values,explode=explode,counter-clockwise=False, shadow=True)
plt.title('Top 5 Causes of Death for Neoplasms [ICD-10] in Italy (all causes and years)')
plt.legend(labels,loc=8)
plt.show()
```

Top 5 Causes of Death for Neoplasms [ICD-10] in Italy (all causes and years)



In [117]:

```
total_italy_neoplasms.head(10)
```

Out[117]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1	...
1053596	4180	NaN	NaN	2003	104	C000	1	0	1	2	...
1053597	4180	NaN	NaN	2003	104	C000	2	0	1	7	...
1053598	4180	NaN	NaN	2003	104	C001	1	0	1	21	...
1053599	4180	NaN	NaN	2003	104	C001	2	0	1	5	...
1053600	4180	NaN	NaN	2003	104	C009	1	0	1	24	...
1053601	4180	NaN	NaN	2003	104	C009	2	0	1	7	...
1053602	4180	NaN	NaN	2003	104	C01	1	0	1	91	...
1053603	4180	NaN	NaN	2003	104	C01	2	0	1	16	...
1053604	4180	NaN	NaN	2003	104	C028	1	0	1	1	...
1053605	4180	NaN	NaN	2003	104	C029	1	0	1	297	...

10 rows × 39 columns

In [113]:

```
new_df = total_italy_neoplasms.groupby(['Cause', 'Deaths1'], sort=True).sum().reset_index()
new_df = new_df.sort_values(by = ['Deaths1'], ascending=False)
print(new_df)
```

	Cause	Deaths1	Country	Admin1	Year	Sex	Frmat	IM_Frmat
Deaths2 \								
1679	C349	25564	4180	0.0	2003	1	0	1
0.0								
1678	C349	25224	4180	0.0	2010	1	0	1
0.0								
1677	C349	25199	4180	0.0	2006	1	0	1
0.0								
1676	C349	25167	4180	0.0	2007	1	0	1
0.0								
1675	C349	25160	4180	0.0	2009	1	0	1
0.0								
1674	C349	25139	4180	0.0	2008	1	0	1
0.0								
1673	C349	25119	4180	0.0	2005	1	0	1
0.0								
1672	C349	25046	4180	0.0	2004	1	0	1
0.0								
1671	C349	25001	4180	0.0	2011	1	0	1
0.0								
1670	C349	24653	4180	0.0	2012	1	0	1
1.0								

1669 0.0	C349	24353	4180	0.0	2013	1	0	1
1668 0.0	C349	24208	4180	0.0	2015	1	0	1
1667 0.0	C349	23933	4180	0.0	2014	1	0	1
2583 0.0	C509	12307	4180	0.0	2015	2	0	1
2582 0.0	C509	12199	4180	0.0	2014	2	0	1
2581 0.0	C509	12193	4180	0.0	2008	2	0	1
2580 0.0	C509	12188	4180	0.0	2009	2	0	1
2579 0.0	C509	12109	4180	0.0	2010	2	0	1
2578 0.0	C509	12003	4180	0.0	2012	2	0	1
2577 0.0	C509	11997	4180	0.0	2011	2	0	1
2576 0.0	C509	11932	4180	0.0	2013	2	0	1
2575 0.0	C509	11903	4180	0.0	2007	2	0	1
2574 0.0	C509	11459	4180	0.0	2006	2	0	1
2573 0.0	C509	11440	4180	0.0	2003	2	0	1
2572 0.0	C509	11348	4180	0.0	2005	2	0	1
2571 0.0	C509	11167	4180	0.0	2004	2	0	1
1666 0.0	C349	9479	4180	0.0	2015	2	0	1
1665 0.0	C349	9115	4180	0.0	2014	2	0	1
1664 0.0	C349	8802	4180	0.0	2013	2	0	1
1663 0.0	C349	8558	4180	0.0	2012	2	0	1
...
...								
412 0.0	C130	1	25080	0.0	12058	9	0	6
5099 0.0	D413	1	62700	0.0	30132	23	0	15
4441 1.0	C960	1	4180	0.0	2010	2	0	1
4362 0.0	C941	1	20900	0.0	10028	7	0	5
297 0.0	C090	1	33440	0.0	16068	10	0	8
4365 0.0	C942	1	20900	0.0	10039	9	0	5
4369 0.0	C943	1	8360	0.0	4018	2	0	2
5133	D420	1	20900	0.0	10046	5	0	5

0.0								
4371	C944	1	37620	0.0	18102	14	0	9
0.0								
4373	C945	1	12540	0.0	6015	4	0	3
0.0								
5129	D419	1	37620	0.0	18084	14	0	9
0.0								
5127	D417	1	12540	0.0	6021	3	0	3
0.0								
4376	C947	1	20900	0.0	10037	6	0	5
0.0								
1079	C227	1	37620	0.0	18074	14	0	9
0.0								
1077	C224	1	12540	0.0	6029	5	0	3
0.0								
1075	C223	1	16720	0.0	8024	7	0	4
0.0								
1070	C222	1	29260	0.0	14062	12	0	7
0.0								
876	C188	1	8360	0.0	4023	4	0	2
0.0								
300	C091	1	33440	0.0	16088	10	0	8
0.0								
999	C212	1	29260	0.0	14045	10	0	7
0.0								
4416	C952	1	12540	0.0	6015	5	0	3
0.0								
304	C098	1	4180	0.0	2014	1	0	1
0.0								
4417	C957	1	16720	0.0	8033	6	0	4
0.0								
328	C100	1	25080	0.0	12062	7	0	6
0.0								
330	C101	1	12540	0.0	6018	4	0	3
0.0								
331	C102	1	8360	0.0	4026	3	0	2
0.0								
332	C103	1	8360	0.0	4016	2	0	2
0.0								
333	C104	1	8360	0.0	4010	3	0	2
0.0								
334	C108	1	20900	0.0	10036	5	0	5
0.0								
0	C000	1	29260	0.0	14078	11	0	7
0.0								
Deaths3		...	Deaths21	Deaths22	Deaths23	Deaths24		
Deaths25 \								
1679	0.0	...	5230.0	3154.0	1125.0	421.0		
51.0								
1678	0.0	...	4936.0	4327.0	2137.0	428.0		
71.0								
1677	0.0	...	5217.0	3828.0	1375.0	412.0		
59.0								
1676	0.0	...	5129.0	3927.0	1618.0	375.0		
61.0								
1675	0.0	...	5109.0	4073.0	1980.0	361.0		

96.0						
1674	0.0	...	5167.0	4016.0	1874.0	392.0
65.0						
1673	0.0	...	5152.0	3622.0	1151.0	430.0
76.0						
1672	0.0	...	5084.0	3384.0	1028.0	421.0
46.0						
1671	0.0	...	4918.0	4209.0	2228.0	485.0
84.0						
1670	0.0	...	4720.0	4298.0	2316.0	539.0
72.0						
1669	0.0	...	4588.0	4157.0	2353.0	684.0
70.0						
1668	0.0	...	4664.0	4166.0	2516.0	715.0
82.0						
1667	0.0	...	4615.0	4154.0	2229.0	671.0
66.0						
2583	0.0	...	1556.0	1732.0	1641.0	1040.0
317.0						
2582	0.0	...	1500.0	1730.0	1569.0	963.0
291.0						
2581	0.0	...	1547.0	1695.0	1434.0	659.0
275.0						
2580	0.0	...	1589.0	1652.0	1508.0	607.0
317.0						
2579	0.0	...	1558.0	1702.0	1529.0	620.0
341.0						
2578	0.0	...	1460.0	1671.0	1542.0	818.0
303.0						
2577	0.0	...	1529.0	1718.0	1556.0	686.0
345.0						
2576	0.0	...	1468.0	1656.0	1489.0	933.0
299.0						
2575	0.0	...	1588.0	1554.0	1198.0	720.0
286.0						
2574	0.0	...	1486.0	1584.0	1030.0	666.0
257.0						
2573	0.0	...	1563.0	1435.0	925.0	649.0
177.0						
2572	0.0	...	1537.0	1623.0	853.0	715.0
232.0						
2571	0.0	...	1530.0	1495.0	766.0	671.0
210.0						
1666	0.0	...	1439.0	1471.0	1165.0	510.0
92.0						
1665	0.0	...	1460.0	1438.0	1023.0	486.0
70.0						
1664	0.0	...	1298.0	1387.0	981.0	423.0
81.0						
1663	0.0	...	1322.0	1340.0	1030.0	363.0
80.0						
...
...						
412	0.0	...	0.0	0.0	1.0	0.0
1.0						
5099	0.0	...	2.0	0.0	3.0	2.0
1.0						

4441	0.0	...	0.0	0.0	0.0	0.0
0.0						
4362	0.0	...	2.0	0.0	1.0	1.0
0.0						
297	0.0	...	1.0	1.0	0.0	0.0
0.0						
4365	0.0	...	1.0	2.0	1.0	0.0
0.0						
4369	0.0	...	1.0	0.0	0.0	0.0
0.0						
5133	0.0	...	0.0	1.0	1.0	0.0
0.0						
4371	0.0	...	1.0	1.0	0.0	0.0
0.0						
4373	0.0	...	1.0	0.0	0.0	0.0
0.0						
5129	0.0	...	2.0	2.0	2.0	0.0
0.0						
5127	0.0	...	0.0	1.0	1.0	0.0
0.0						
4376	0.0	...	0.0	0.0	0.0	0.0
0.0						
1079	0.0	...	3.0	3.0	0.0	0.0
0.0						
1077	0.0	...	0.0	1.0	0.0	0.0
0.0						
1075	0.0	...	0.0	1.0	1.0	0.0
0.0						
1070	0.0	...	0.0	0.0	0.0	0.0
0.0						
876	0.0	...	0.0	0.0	0.0	1.0
0.0						
300	0.0	...	1.0	1.0	2.0	1.0
0.0						
999	0.0	...	2.0	1.0	1.0	0.0
0.0						
4416	0.0	...	1.0	1.0	0.0	0.0
0.0						
304	0.0	...	1.0	0.0	0.0	0.0
0.0						
4417	0.0	...	0.0	3.0	1.0	0.0
0.0						
328	0.0	...	0.0	0.0	1.0	0.0
0.0						
330	0.0	...	1.0	0.0	0.0	0.0
0.0						
331	0.0	...	0.0	0.0	0.0	0.0
0.0						
332	0.0	...	0.0	0.0	0.0	0.0
0.0						
333	0.0	...	0.0	0.0	0.0	0.0
0.0						
334	0.0	...	0.0	1.0	0.0	0.0
0.0						
0	0.0	...	2.0	2.0	0.0	2.0
1.0						

	Deaths26	IM_Deaths1	IM_Deaths2	IM_Deaths3	IM_Deaths4
1679	0.0	0.0	0.0	0.0	0.0
1678	0.0	0.0	0.0	0.0	0.0
1677	0.0	0.0	0.0	0.0	0.0
1676	0.0	0.0	0.0	0.0	0.0
1675	0.0	0.0	0.0	0.0	0.0
1674	0.0	0.0	0.0	0.0	0.0
1673	0.0	0.0	0.0	0.0	0.0
1672	0.0	0.0	0.0	0.0	0.0
1671	1.0	0.0	0.0	0.0	0.0
1670	0.0	0.0	0.0	0.0	1.0
1669	0.0	0.0	0.0	0.0	0.0
1668	0.0	0.0	0.0	0.0	0.0
1667	0.0	0.0	0.0	0.0	0.0
2583	0.0	0.0	0.0	0.0	0.0
2582	0.0	0.0	0.0	0.0	0.0
2581	0.0	0.0	0.0	0.0	0.0
2580	0.0	0.0	0.0	0.0	0.0
2579	0.0	0.0	0.0	0.0	0.0
2578	0.0	0.0	0.0	0.0	0.0
2577	0.0	0.0	0.0	0.0	0.0
2576	0.0	0.0	0.0	0.0	0.0
2575	0.0	0.0	0.0	0.0	0.0
2574	0.0	0.0	0.0	0.0	0.0
2573	0.0	0.0	0.0	0.0	0.0
2572	0.0	0.0	0.0	0.0	0.0
2571	0.0	0.0	0.0	0.0	0.0
1666	0.0	0.0	0.0	0.0	0.0
1665	0.0	0.0	0.0	0.0	0.0
1664	0.0	0.0	0.0	0.0	0.0
1663	0.0	0.0	0.0	0.0	0.0
...
412	0.0	0.0	0.0	0.0	0.0
5099	0.0	0.0	0.0	0.0	0.0
4441	0.0	0.0	0.0	0.0	1.0
4362	0.0	0.0	0.0	0.0	0.0
297	0.0	0.0	0.0	0.0	0.0
4365	0.0	0.0	0.0	0.0	0.0
4369	0.0	0.0	0.0	0.0	0.0
5133	0.0	0.0	0.0	0.0	0.0
4371	0.0	0.0	0.0	0.0	0.0
4373	0.0	0.0	0.0	0.0	0.0
5129	0.0	0.0	0.0	0.0	0.0
5127	0.0	0.0	0.0	0.0	0.0
4376	0.0	0.0	0.0	0.0	0.0
1079	0.0	0.0	0.0	0.0	0.0
1077	0.0	0.0	0.0	0.0	0.0
1075	0.0	0.0	0.0	0.0	0.0
1070	0.0	0.0	0.0	0.0	0.0
876	0.0	0.0	0.0	0.0	0.0
300	0.0	0.0	0.0	0.0	0.0
999	0.0	0.0	0.0	0.0	0.0
4416	0.0	0.0	0.0	0.0	0.0
304	0.0	0.0	0.0	0.0	0.0
4417	0.0	0.0	0.0	0.0	0.0
328	0.0	0.0	0.0	0.0	0.0
330	0.0	0.0	0.0	0.0	0.0

```
331      0.0      0.0      0.0      0.0      0.0
332      0.0      0.0      0.0      0.0      0.0
333      0.0      0.0      0.0      0.0      0.0
334      0.0      0.0      0.0      0.0      0.0
0        0.0      0.0      0.0      0.0      0.0
```

[5464 rows x 37 columns]

In [197]:

```
country_deaths.head(3)
```

Out[197]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
1322928	5020	NaN	NaN	1998	104	A021	2	0	1	1
1322929	5020	NaN	NaN	1998	104	A047	1	0	1	1
1322930	5020	NaN	NaN	1998	104	A047	2	0	1	4

3 rows x 39 columns

In []:

```
neoplasms
```

In [51]:

```
#Now we need to bring in the data for Australia for neoplasms to answer the next set of questions
australia_flat = countries_icd_2010[(countries_icd_2010.Country == 5020) & (countries_icd_2010.Year == 2010)]
```

In []:

In [52]:

```
australia_flat
```

Out[52]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1	...	Dea
--	---------	--------	--------	------	------	-------	-----	-------	----------	---------	-----	-----

0 rows x 39 columns

In [167]:

```
country_codes = ["5020"]

lookup_pop.Country.isin(countries)

country_pop= lookup_pop[lookup_pop.Country.isin(country_codes)]

country_pop.shape
```

Out[167]:

(132, 33)

In [55]:

```
country_pop.head()
```

Out[55]:

	Country	Admin1	SubDiv	Year	Sex	Frmat	Pop1	Pop2	Pop3	Pop4
9077	5020	NaN	NaN	1950	1	1	4122900.0	94500.0	89700.0	91100.0
9078	5020	NaN	NaN	1950	2	1	4055800.0	90400.0	85800.0	87000.0
9079	5020	NaN	NaN	1951	1	1	4253700.0	96900.0	95400.0	91600.0
9080	5020	NaN	NaN	1951	2	1	4168000.0	92500.0	91300.0	87400.0
9081	5020	NaN	NaN	1952	1	1	4372600.0	99000.0	97100.0	96200.0

5 rows x 33 columns

In [56]:

```
#slicing out only the year of interest 2010
year_interest = ["2010"]

country_pop.Year.isin(countries)

countries_2010= country_pop[country_pop.Year.isin(year_interest)]

countries_2010.shape
```

Out[56]:

(2, 33)

In [57]:

```
countries_2010
```

Out[57]:

	Country	Admin1	SubDiv	Year	Sex	Frmat	Pop1	Pop2	Pop3	Po
9197	5020	NaN	NaN	2010	1	0	11100244.0	148602.0	152751.0	150726
9198	5020	NaN	NaN	2010	2	0	11197271.0	140766.0	144762.0	143595

2 rows x 33 columns

In [58]:

```
#now we can group by country and sum the male and female total
#population to get the total country population in 2010
countries_2010.groupby('Country')['Pop1'].sum()
```

Out[58]:

Country
5020 22297515.0
Name: Pop1, dtype: float64

In []:

```
#This gives us the answer to the population of Australia in 2010
#total 2010 population for the countries of interest
#Australia 22,297,515
```

In [61]:

```
lookup_bothicd.head()
```

Out[61]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1	...	De
0	1400	NaN	NaN	2001	101	1000	1	7	8	332	...	
1	1400	NaN	NaN	2001	101	1000	2	7	8	222	...	
2	1400	NaN	NaN	2001	101	1001	1	7	8	24	...	
3	1400	NaN	NaN	2001	101	1001	2	7	8	14	...	
4	1400	NaN	NaN	2001	101	1002	1	7	8	0	...	

5 rows x 30 columns

In [168]:

```
country_codes = ["5020"]

lookup_bothicd.Country.isin(country_codes)

country_deaths= lookup_bothicd[lookup_bothicd.Country.isin(country_codes)]

country_deaths.shape
```

Out[168]:

(60396, 39)

In [198]:

```
country_deaths.head(3)
```

Out[198]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
1322928	5020	NaN	NaN	1998	104	A021	2	0	1	1
1322929	5020	NaN	NaN	1998	104	A047	1	0	1	1
1322930	5020	NaN	NaN	1998	104	A047	2	0	1	4

3 rows x 39 columns

In [199]:

```
all_aus_deaths = country_deaths.groupby('Cause')['Deaths1'].sum()
```

In [200]:

```
all_aus_deaths.head(3)
```

Out[200]:

```
Cause
A000      1
A010      1
A020     66
Name: Deaths1, dtype: int64
```

In [174]:

```
icd_codes_aus1 = country_deaths[(country_deaths.Cause >= 'C00') & (country_deaths.Cause <= 'C97')]
```

In [176]:

```
icd_codes_au1.head(3)
```

Out[176]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1	...
1323109	5020	NaN	NaN	1998	104	C001	1	0	1	1	...
1323110	5020	NaN	NaN	1998	104	C001	2	0	1	1	...
1323111	5020	NaN	NaN	1998	104	C005	2	0	1	1	...

3 rows x 39 columns

In [177]:

```
icd_codes_au2 = country_deaths[(country_deaths.Cause >= 'D00') & (country_deaths.Cause <= 'D48')]
```

In [179]:

```
icd_codes_au2.head(3)
```

Out[179]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
1323607	5020	NaN	NaN	1998	104	D022	2	0	1	1
1323608	5020	NaN	NaN	1998	104	D023	2	0	1	1
1323609	5020	NaN	NaN	1998	104	D101	2	0	1	1

3 rows x 39 columns

In [180]:

```
frame1 = icd_codes_au1

frame2 = icd_codes_au2

total_au_neoplasms = df.append(frame2)
```

In [182]:

```
total_aus_neoplasms.head(3)
```

Out[182]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1	...
1053596	4180	NaN	NaN	2003	104	C000	1	0	1	2	...
1053597	4180	NaN	NaN	2003	104	C000	2	0	1	7	...
1053598	4180	NaN	NaN	2003	104	C001	1	0	1	21	...

3 rows x 39 columns

In [184]:

```
aus_group1 = total_aus_neoplasms.groupby('Cause')['Deaths1'].sum()
```

In [186]:

```
aus_group1.head(3)
```

Out[186]:

Cause	
C000	68
C001	355
C002	1

Name: Deaths1, dtype: int64

In [187]:

```
aus_indexed1 = aus_group1.to_frame(name = 'count').reset_index()
```

In [189]:

```
aus_indexed1.head(3)
```

Out[189]:

	Cause	count
0	C000	68
1	C001	355
2	C002	1

In [190]:

```
aus_sorted1 = aus_indexed1.sort_values(by=['count'], ascending=False)
```

In [192]:

```
aus_sorted1.head(6)
```

Out[192]:

	Cause	count
143	C349	426451
227	C509	155895
92	C189	143188
76	C169	125679
118	C259	120070
259	C61	95906

In [165]:

```
array = [ 'Deaths1' ,
'Deaths2' ,
'Deaths3' ,
'Deaths4' ,
'Deaths5' ,
'Deaths6' ,
'Deaths7' ,
'Deaths8' ,
'Deaths9' ,
'Deaths10' ,
'Deaths11' ,
'Deaths12' ,
'Deaths13' ,
'Deaths14' ,
'Deaths15' ,
'Deaths16' ,
'Deaths17' ,
'Deaths18' ,
'Deaths19' ,
'Deaths20' ,
'Deaths21' ,
'Deaths22' ,
'Deaths23' ,
'Deaths24' ]
```

In [166]:

```
#Selecting out only 2010 now
year_interest = ["2010"]

country_deaths.Year.isin(year_interest)

countries_icd_2010= country_deaths[country_deaths.Year.isin(year_interest)]

countries_icd_2010.shape
```

Out[166]:

(3777, 39)

In []:

```
aus_neoplasms1 = country_deaths[(country_deaths.Cause >= 'C00') & (country_deaths.Cause <= 'C97')]
```

In [229]:

```
countries_icd_2010.head(3)
```

Out[229]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
2259163	5020	NaN	NaN	2010	104	A020	1	0	1	1
2259164	5020	NaN	NaN	2010	104	A020	2	0	1	4
2259165	5020	NaN	NaN	2010	104	A021	1	0	1	3

3 rows × 39 columns

In [230]:

```
countries_icd_2010.groupby('Country')['Deaths1'].sum()
```

Out[230]:

```
Country
5020      286946
Name: Deaths1, dtype: int64
```

In [231]:

```
pa=pd.DataFrame(countries_icd_2010)
```

In [232]:

```
pa.head(3)
```

Out[232]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1	...
2259163	5020	NaN	NaN	2010	104	A020	1	0	1	1	...
2259164	5020	NaN	NaN	2010	104	A020	2	0	1	4	...
2259165	5020	NaN	NaN	2010	104	A021	1	0	1	3	...

3 rows x 39 columns

In [233]:

```
australia_flat = countries_icd_2010[(countries_icd_2010.Country == 5020) & (countries_icd_2010.Year == 2010)]
```

In [234]:

```
australia_flat.head(3)
```

Out[234]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
2259163	5020	NaN	NaN	2010	104	A020	1	0	1	1
2259164	5020	NaN	NaN	2010	104	A020	2	0	1	4
2259165	5020	NaN	NaN	2010	104	A021	1	0	1	3

3 rows x 39 columns

In [235]:

```
australia_dist = australia_flat.groupby(['Country'])['Deaths2','Deaths3','Deaths4','Deaths5','Deaths6','Deaths7','Deaths8','Deaths9','Deaths10','Deaths11','Deaths12','Deaths13','Deaths14','Deaths15','Deaths16','Deaths17','Deaths18','Deaths19','Deaths20','Deaths21','Deaths22','Deaths23','Deaths24','Deaths25','Deaths26'].sum()
```

In [236]:

australia_dist

Out[236]:

	Deaths2	Deaths3	Deaths4	Deaths5	Deaths6	Deaths7	Deaths8	Deaths9	Deat
Country									
5020	2458.0	202.0	130.0	66.0	54.0	282.0	280.0	1058.0	14

1 rows x 25 columns

In []:

```
#using this set, we can determine the answer to question 4 part a - identify the top five age groups in Australia
#dying with neoplasms cause of death

australia_dist

first we need to select out the neoplasms

#aus_neo1 = australia_flat[(australia_flat.Cause >= 'C00') & (australia_flat.Cause <= 'C97')]

#aus_neo2 = australia_flat[(australia_flat.Cause >= 'D00') & (australia_flat.Cause <= 'D48')]

#aus_frame1 = aus_neo1

#aus_frame2 = aus_neo1

#total_aus_frame = df.append(aus_frame2)

#aus_2010_1 = total_aus_frame.groupby('Cause')['Deaths1'].sum()

#aus_2010indexed1 = aus_2010_1.to_frame(name = 'count').reset_index()

#aus_2010sorted1 = aus_2010indexed1.sort_values(by=['count'], ascending=False)
```

In [237]:

```
aus_neo1 = australia_flat[(australia_flat.Cause >= 'C00') & (australia_flat.Cause <= 'C97')]
```

In [238]:

```
aus_neo1.head(3)
```

Out[238]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
2259359	5020	NaN	NaN	2010	104	C001	1	0	1	2
2259360	5020	NaN	NaN	2010	104	C001	2	0	1	2
2259361	5020	NaN	NaN	2010	104	C009	1	0	1	2

3 rows x 11 columns

In [239]:

```
aus_neo2 = australia_flat[(australia_flat.Cause >= 'D00') & (australia_flat.Cause <= 'D48')]
```

In [240]:

```
aus_neo2.head(3)
```

Out[240]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
2259816	5020	NaN	NaN	2010	104	D125	2	0	1	1
2259817	5020	NaN	NaN	2010	104	D126	2	0	1	1
2259818	5020	NaN	NaN	2010	104	D130	1	0	1	1

3 rows x 11 columns

In [241]:

```
aus_frame1 = aus_neo1

aus_frame2 = aus_neo2

total_aus_2010neo = df.append(aus_frame2)
```


In [242]:

```
total_aus_2010neo.head(5)
```

Out[242]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1	...
1053596	4180	NaN	NaN	2003	104	C000	1	0	1	2	...
1053597	4180	NaN	NaN	2003	104	C000	2	0	1	7	...
1053598	4180	NaN	NaN	2003	104	C001	1	0	1	21	...
1053599	4180	NaN	NaN	2003	104	C001	2	0	1	5	...
1053600	4180	NaN	NaN	2003	104	C009	1	0	1	24	...

5 rows × 39 columns

In [243]:

```
australia_neoplasm_2010 = australia_flat[(australia_flat.Country == 5020) & (australia_flat.Year == 2010)]
```

In [245]:

```
australia_neoplasm_2010.head(3)
```

Out[245]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
2259163	5020	NaN	NaN	2010	104	A020	1	0	1	1
2259164	5020	NaN	NaN	2010	104	A020	2	0	1	4
2259165	5020	NaN	NaN	2010	104	A021	1	0	1	3

3 rows × 39 columns

In [248]:

```
type(australia_neoplasm_2010)
```

Out[248]:

pandas.core.frame.DataFrame

In [213]:

```
aus_2010indexed1.head(5)
```

Out[213]:

	Cause	count
0	C000	68
1	C001	359
2	C002	1
3	C004	1
4	C005	2

In [214]:

```
aus_2010sorted1 = aus_2010indexed1.sort_values(by=['count'], ascending=False)
```

In [215]:

```
aus_2010sorted1.head(5)
```

Out[215]:

	Cause	count
143	C349	434440
227	C509	158760
92	C189	144926
76	C169	126683
118	C259	122437

In [218]:

```
aus_neo2.head(5)
```

Out[218]:

	Country	Admin1	SubDiv	Year	List	Cause	Sex	Frmat	IM_Frmat	Deaths1
2259816	5020	NaN	NaN	2010	104	D125	2	0	1	1
2259817	5020	NaN	NaN	2010	104	D126	2	0	1	1
2259818	5020	NaN	NaN	2010	104	D130	1	0	1	1
2259819	5020	NaN	NaN	2010	104	D131	2	0	1	1
2259820	5020	NaN	NaN	2010	104	D134	2	0	1	1

5 rows x 11 columns

In []:

In [83]:

```
australia_dist['<10'] = australia_dist['Deaths2'] + australia_dist['Deaths3']
+ australia_dist['Deaths4'] + australia_dist['Deaths5'] + australia_dist['Deaths6'] + australia_dist['Deaths7']
australia_dist['10-19'] = australia_dist['Deaths8'] + australia_dist['Deaths9']
australia_dist['20-29'] = australia_dist['Deaths10'] + australia_dist['Deaths11']
australia_dist['30-39'] = australia_dist['Deaths12'] + australia_dist['Deaths13']
australia_dist['40-49'] = australia_dist['Deaths14'] + australia_dist['Deaths15']
australia_dist['50-59'] = australia_dist['Deaths16'] + australia_dist['Deaths17']
australia_dist['60 and over'] = australia_dist['Deaths18'] + australia_dist['Deaths19'] + australia_dist['Deaths20'] + australia_dist['Deaths21'] + australia_dist['Deaths22'] + australia_dist['Deaths23'] + australia_dist['Deaths24'] + australia_dist['Deaths25'] + australia_dist['Deaths26']
```

In [84]:

```
australia_dist
```

Out[84]:

	Deaths2	Deaths3	Deaths4	Deaths5	Deaths6	Deaths7	Deaths8	Deaths9	Deaths10
Country	5020	2458.0	202.0	130.0	66.0	54.0	282.0	280.0	1058.0

1 rows x 10 columns

In [85]:

```
australia_bands = australia_dist[['<10', '10-19', '20-29', '30-39', '40-49', '50-59', '60 and over']]
```

In [86]:

```
australia_bands
```

Out[86]:

	<10	10-19	20-29	30-39	40-49	50-59	60 and over
Country	5020	3192.0	1338.0	3146.0	4928.0	9800.0	19076.0

In [193]:

```
# x-coordinates of left sides of bars
left = [1, 2, 3, 4, 5, 6, 7]

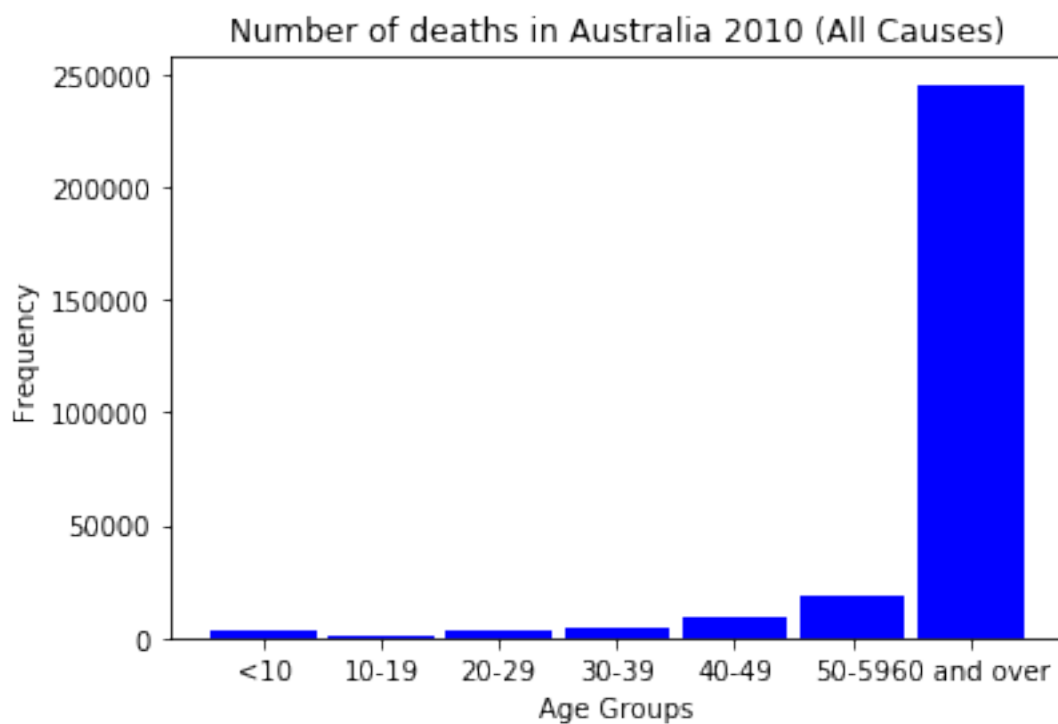
# heights of bars
height = [3192, 1338, 3146, 4928, 9800, 19076, 245466]

# labels for bars
tick_label = ['<10', '10-19', '20-29', '30-39', '40-49', '50-59', '60 and over']

# plotting a bar chart
plt.bar(left, height, tick_label = tick_label,
        width = 0.90, color = ['blue'])

# naming the x-axis
plt.xlabel('Age Groups')
# naming the y-axis
plt.ylabel('Frequency')
# plot title
plt.title('Number of deaths in Australia 2010 (All Causes)')

# function to show the plot
plt.show()
```



In []: