### HW_Midterm_exam Q8 #######
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# Course : Knowledge Discovery and Data Mining (CS 513-A)
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#purpose : Probability.
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# 8(10 Points)

The following table shows the population and the actual current prevalence rate of COVID19 in the US, Italy and Spain.
Considering only the three countries (US, Italy and Spain) use the table to answer the following questions:

a) Estimate the number of cases in the US, Italy and Spain.
b) Given that a person is living in the US, what is the probability that the person is infected with COVID19.
c) Given that a person is diagnosed with the COVID19, what is the probability that the person lives in the US.

| | Population rounded to nearest Million | Prevalence Cases Per Million |
|---|---|---|
| US | 331 | 381.24 |
| Italy | 60 | 1463.97 |
| Spain | 47 | 1590.24 |

| | Population rounded to nearest million | Prevelance Cases Per million | Cases rounded to nearest million |
|---|---|---|---|
| USA | 331 | 381.24 | 126190.44 |
| ITALY | 60 | 1463.97 | 87838.2 |
| SPAIN | 47 | 1590.24 | 74741.28 |

a) Estimate the number of cases in the US, Italy and Spain.

= Infected in USA + Infected in Italy + Infected in Spain

= 126190.44 + 87838.2 + 74741.28

= 288769.92

b)Given that a person is living in the US, what is the probability that the person is infected with COVID19.

= P(infected/US)

= P(infected && US)/P(US)

= (126190.44)/(331*10^6)

= 0.000381 = 0.0381%

c) Given that a person is diagnosed with the COVID19, what is the probability that the person lives in the US

= P(US/infected)

= P(infected && US)/P(Infected)

= 126190.44 /288769.92

= 0.436 * 100 = 43.6%