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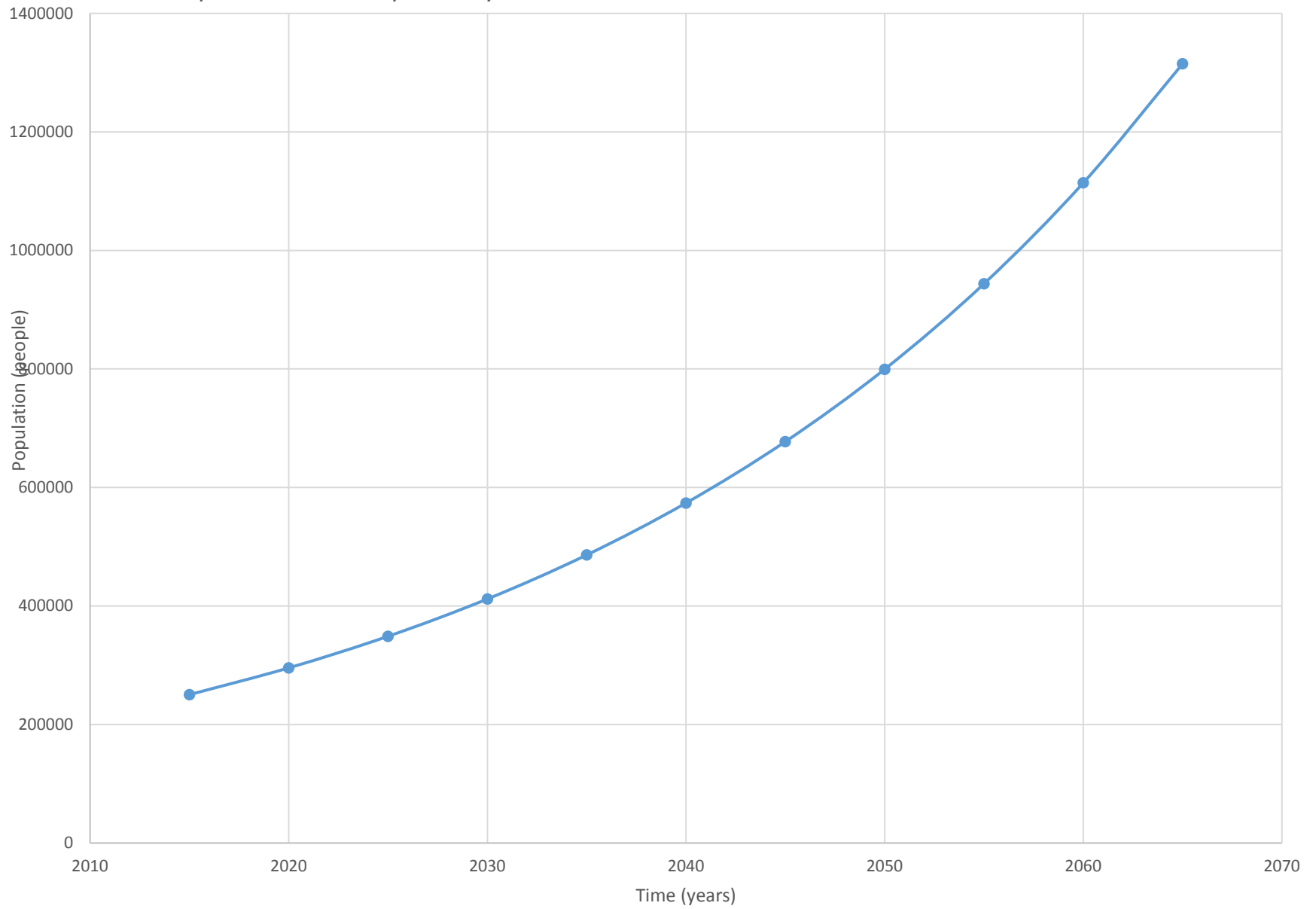
Sheet two:	Models/Stats
Sheet three:	Graphs
Sheet Four:	Formula Sheet
Sheet Five:	Question Sheet

Input Parameters							
Location	Irvine Ca						
Data Reference	https://legacy.cityofirvine.org/about/demographics.asp						
Model Start Year	2015						
Population at start year P(0)	212,117						
growth rate [r]	0.033172						
model time increment (years)	5						
Current population (2015)	250,384						

Model:

Time (actual year)	Time (model year)	Model Population
2015	0	250384
2020	5	295554.564
2025	10	348874.1306
2030	15	411812.8218
2035	20	486105.9772
2040	25	573802.0007
2045	30	677318.8389
2050	35	799510.6482
2055	40	943746.4896
2060	45	1114003.22
2065	50	1314975.142

Population Growth per five year increments



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ENGR 115

5-Feb-16

Input Parameters

Location	Irvine Ca							
Data Reference	https://legacy.cityofirvine.org/about/demographics.asp							
Model Start Year	2015							
Population at start year P(0)	212,117							
growth rate [r]	0.03317155							
model time increment (years)	5							
Current population (2015)	250,384							

Model:

Time (actual year)	Time (model)	Model Population
2015	0	250384
2020	5	295554.564
2025	10	348874.131
2030	15	411812.822
2035	20	486105.977
2040	25	573802.001
2045	30	677318.839
2050	35	799510.648
2055	40	943746.49
2060	45	1114003.22
2065	50	1314975.14

Use your model to determine the doubling time (rounded to the nearest year) at the growth rate you calculated above. You may need to increase the number of years Excel calculates to determine this on your model page. Check your model prediction with the hand calculation you did at the beginning of lab. State the doubling time from your hand calculation and the double time provided by your model. Does the doubling time from your model match the doubling time from your hand calculation?

Question 1) Doubling time= $\ln(2)/r$

Answer 1) 20.89583584

The answer (of 20.89583584) matches my hand calculation $\ln(2)/0.033171546 = 20.89583584$ years. I derived this equation by using $P(t) = P_0 e^{rt}$ to calculate doubling time.

What growth rate would you recommend for your chosen place? Justify your recommendation as much as possible using the information you have on your chosen area and simulations you run using your spreadsheet model. One way to start could be by suggesting a carrying capacity for your place and adjusting the growth rate so that the capacity is not exceeded over a 50-year period. Be sure to include this carrying capacity value in your justification.

Question 2) The growth rate that I would recommend for my chosen place, is an exponential growth. Every five years the population seems to increase by 1,000. For example from 2015 to 2020 there is an increase of 45,170,564, but from 2020 to 2025 the population increases by 5335,567, each year the population has a constant increase of around 1,000. If every five years the growth difference is maintained by a carrying capacity of 1,000 the population should have a sustainable amount of people in the next fifty years.

Answer 2) 1. Does an exponential growth model seem like a reasonable model for human population growth? Why or why not?

Question 3) Yes, I believe the exponential growth model is a reasonable model for human population growth. I believe this because the exponential growth model indicates growth at a constant rate, rather than a constant amount. With a constant rate, researchers are able to evaluate a sustainable growth in population. I think it depends heavily on the location of the research being done on the population increase. In a small town the exponential growth model wouldn't have a large effect, but in a city it would be able to show an accurate depiction of the population growth.

Answer 3)

Time (actual year)	Time (model year)	Model Population
2015	0	250384
2020	5	295554.564
2025	10	348874.1306
2030	15	411812.8218
2035	20	486105.9772
2040	25	573802.0007
2045	30	677318.8389
2050	35	799510.6482
2055	40	943746.4896
2060	45	1114003.22
2065	50	1314975.142

Location	Irvine Ca						
Data Reference	https://regisr.citgov.irvine.org/about/demographics.asp						
Model Start Year	2015						
Population at Start Y	212,117						
Growth rate (r)	0.033171546						
Model time increase	5						
Current population	250,384						