

Jacob Turner

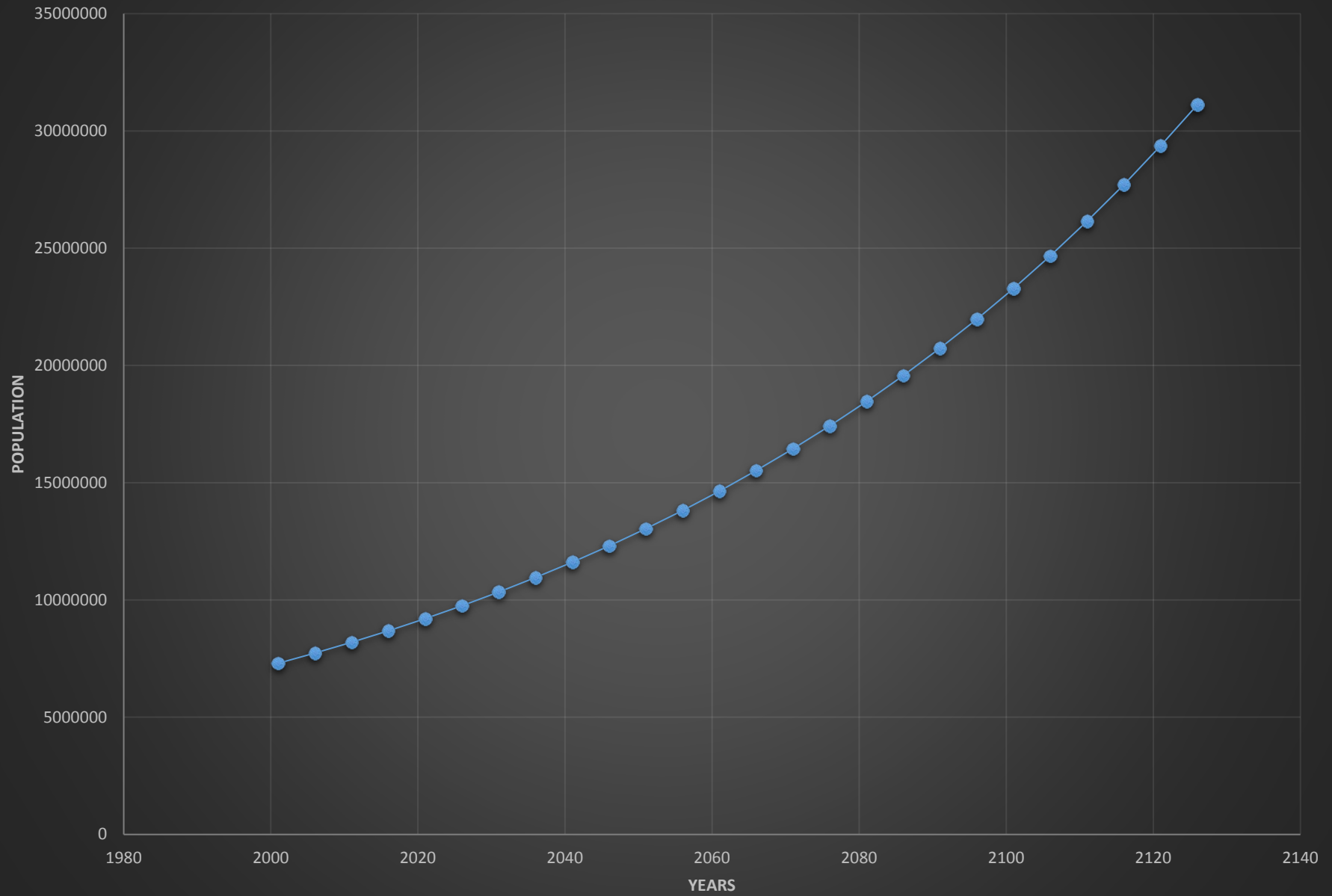
ENGR 116

16-Sep-16

| Input Parameters | |
|------------------|---|
| Location | London http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/rel/mro/news-release/census-result-shows-increase-in-population-of- |
| Data source | |
| Model Start Year | 2001 |
| Data Start Year | 2001 |
| Data End Year | 2011 |
| Time Increment | 5 |
| Population Start | 7300000 |
| Growth Rate | 1.16% |

| Year | Time (yrs) | Population Estimate | |
|------|------------|---------------------|--|
| 2001 | 0 | 7300000 | |
| 2006 | 5 | 7735919 | |
| 2011 | 10 | 8197870 | |
| 2016 | 15 | 8687406 | |
| 2021 | 20 | 9206174 | |
| 2026 | 25 | 9755921 | |
| 2031 | 30 | 10338495 | |
| 2036 | 35 | 10955859 | |
| 2041 | 40 | 11610088 | |
| 2046 | 45 | 12303384 | |
| 2051 | 50 | 13038081 | |
| 2056 | 55 | 13816649 | |
| 2061 | 60 | 14641711 | |
| 2066 | 65 | 15516040 | |
| 2071 | 70 | 16442581 | |
| 2076 | 75 | 17424449 | |
| 2081 | 80 | 18464950 | |
| 2086 | 85 | 19567585 | |
| 2091 | 90 | 20736063 | |
| 2096 | 95 | 21974317 | |
| 2101 | 100 | 23286513 | |
| 2106 | 105 | 24677067 | |
| 2111 | 110 | 26150658 | |
| 2116 | 115 | 27712244 | |
| 2121 | 120 | 29367081 | |
| 2126 | 125 | 31120736 | |

London Population



1. 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?

2. 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.

3. Does an exponential growth model seem like a reasonable model for human population growth? Why or why not?

1. My growth rate is 1.16% with a doubling time of 59.75 years which puts the time at about 2061 that the population of London should be doubled. The double time provided by model is also about 2061 so the times match.

2. I would suggest London to have a carrying capacity upwards of 25 million when considering size of the city, the sustainability of the infrastructure and, the cost of living efficiently in that area. Therefore for London to stay under that population for the next 50 years, until 2066 it can continue growing at its current rate.

3. Yes, in very vague terms but also no, because there are many factors it does not factor in such as, carrying capacity, disease, disaster, and even changing growth rates. A more realistic Population prediction would look very different.

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| Input Parameters | |
|-------------------|---|
| Location | London http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/rel/mro/news-release/census-result- |
| Data source | us-result- |
| Model Start Year | 2001 |
| Data Start Year | 2001 |
| Data End Year | 2011 |
| Time Increment | 5 |
| Population Start | 7300000 p |
| Carrying Capacity | 25000000 k |
| Growth Rate | 0.0116 r |

| Year | Time (yrs) | Estimate | |
|------|------------|----------------------------|---|
| | | (Exponential Growth Model) | Population Estimate (Logistic Growth Model) |
| 2001 | 0 | 7300000 | 7300000 |
| 2006 | 5 | 7735919 | 7603342 |
| 2011 | 10 | 8197870 | 7913653 |
| 2016 | 15 | 8687406 | 8230636 |
| 2021 | 20 | 9206174 | 8553961 |
| 2026 | 25 | 9755921 | 8883258 |
| 2031 | 30 | 10338495 | 9218126 |
| 2036 | 35 | 10955859 | 9558132 |
| 2041 | 40 | 11610088 | 9902809 |
| 2046 | 45 | 12303384 | 10251664 |
| 2051 | 50 | 13038081 | 10604176 |
| 2056 | 55 | 13816649 | 10959802 |
| 2061 | 60 | 14641711 | 11317978 |
| 2066 | 65 | 15516040 | 11678123 |
| 2071 | 70 | 16442581 | 12039644 |
| 2076 | 75 | 17424449 | 12401938 |
| 2081 | 80 | 18464950 | 12764396 |

| | | | |
|------|-----|-----------|----------|
| 2086 | 85 | 19567585 | 13126411 |
| 2091 | 90 | 20736063 | 13487374 |
| 2096 | 95 | 21974317 | 13846689 |
| 2101 | 100 | 23286513 | 14203766 |
| 2106 | 105 | 24677067 | 14558031 |
| 2111 | 110 | 26150658 | 14908931 |
| 2116 | 115 | 27712244 | 15255932 |
| 2121 | 120 | 29367081 | 15598525 |
| 2126 | 125 | 31120736 | 15936228 |
| 2131 | 130 | 32979111 | 16268592 |
| 2136 | 135 | 34948458 | 16595195 |
| 2141 | 140 | 37035405 | 16915653 |
| 2146 | 145 | 39246974 | 17229613 |
| 2151 | 150 | 41590607 | 17536761 |
| 2156 | 155 | 44074190 | 17836814 |
| 2161 | 160 | 46706080 | 18129531 |
| 2166 | 165 | 49495133 | 18414702 |
| 2171 | 170 | 52450735 | 18692154 |
| 2176 | 175 | 55582830 | 18961751 |
| 2181 | 180 | 58901959 | 19223385 |
| 2186 | 185 | 62419289 | 19476985 |
| 2191 | 190 | 66146657 | 19722509 |
| 2196 | 195 | 70096604 | 19959942 |
| 2201 | 200 | 74282422 | 20189298 |
| 2206 | 205 | 78718197 | 20410617 |
| 2211 | 210 | 83418854 | 20623961 |
| 2216 | 215 | 88400210 | 20829414 |
| 2221 | 220 | 93679028 | 21027080 |
| 2226 | 225 | 99273071 | 21217078 |
| 2231 | 230 | 105201162 | 21399546 |
| 2236 | 235 | 111483249 | 21574633 |
| 2241 | 240 | 118140471 | 21742502 |
| 2246 | 245 | 125195229 | 21903326 |
| 2251 | 250 | 132671261 | 22057283 |
| 2256 | 255 | 140593725 | 22204564 |
| 2261 | 260 | 148989279 | 22345360 |
| 2266 | 265 | 157886173 | 22479870 |
| 2271 | 270 | 167314345 | 22608294 |
| 2276 | 275 | 177305520 | 22730833 |
| 2281 | 280 | 187893319 | 22847693 |
| 2286 | 285 | 199113367 | 22959074 |
| 2291 | 290 | 211003421 | 23065180 |
| 2296 | 295 | 223603490 | 23166210 |
| 2301 | 300 | 236955971 | 23262362 |
| 2306 | 305 | 251105796 | 23353830 |
| 2311 | 310 | 266100577 | 23440807 |
| 2316 | 315 | 281990772 | 23523478 |

| | | | |
|------|-----|------------|----------|
| 2321 | 320 | 298829850 | 23602028 |
| 2326 | 325 | 316674473 | 23676633 |
| 2331 | 330 | 335584688 | 23747469 |
| 2336 | 335 | 355624126 | 23814703 |
| 2341 | 340 | 376860220 | 23878498 |
| 2346 | 345 | 399364426 | 23939013 |
| 2351 | 350 | 423212471 | 23996399 |
| 2356 | 355 | 448484602 | 24050805 |
| 2361 | 360 | 475265858 | 24102372 |
| 2366 | 365 | 503646356 | 24151236 |
| 2371 | 370 | 533721597 | 24197529 |
| 2376 | 375 | 565592779 | 24241376 |
| 2381 | 380 | 599367150 | 24282898 |
| 2386 | 385 | 635158357 | 24322211 |
| 2391 | 390 | 673086835 | 24359426 |
| 2396 | 395 | 713280213 | 24394648 |
| 2401 | 400 | 755873737 | 24427980 |
| 2406 | 405 | 801010734 | 24459516 |
| 2411 | 410 | 848843087 | 24489350 |
| 2416 | 415 | 899531748 | 24517570 |
| 2421 | 420 | 953247283 | 24544260 |
| 2426 | 425 | 1010170440 | 24569498 |
| 2431 | 430 | 1070492764 | 24593362 |
| 2436 | 435 | 1134417234 | 24615925 |
| 2441 | 440 | 1202158955 | 24637253 |
| 2446 | 445 | 1273945871 | 24657414 |
| 2451 | 450 | 1350019544 | 24676469 |
| 2456 | 455 | 1430635955 | 24694477 |
| 2461 | 460 | 1516066375 | 24711495 |
| 2466 | 465 | 1606598272 | 24727575 |
| 2471 | 470 | 1702536281 | 24742768 |
| 2476 | 475 | 1804203228 | 24757122 |
| 2481 | 480 | 1911941216 | 24770683 |
| 2486 | 485 | 2026112777 | 24783493 |
| 2491 | 490 | 2147102093 | 24795593 |
| 2496 | 495 | 2275316285 | 24807023 |

Pop. Estimate Using Logistic Growth Model

