

Written HW11 – MATH 1530 Fall 2020

Due by 25 November for timely completion credit

For continuous growth/decay we use the model

$$y_0 e^{rt},$$

where y_0 denotes the initial population and r is the growth rate. For percent growth/decay over a time period, we use the model

$$y_0(1 + P)^{\frac{t}{T}},$$

where y_0 denotes the initial population, P is the percent growth (P is between 0 and 1) and T is the time period.

1. The population of West Virginia in 2019 was 1.792 million people. Between 2018 and 2019, West Virginia lost approximately 1% of its population. If this trend continues, then how many years will it take for West Virginia to lose 100,000 (0.1 million) residents?
2. Pu-239 (an isotope of plutonium) is produced from uranium-238. According to an article in Popular Science (<https://www.popsoci.com/its-not-so-easy-to-get-rid-34-metric-tons-plutonium/>), the United States and Russia have stockpiled 209.3 metric tons of Pu-239. Pu-239 has a half-life of 24,100 years. How long would it take for the combined stockpile of the United States and Russia to decay to only 50 metric tons? (*hint: this problem uses the continuous model*)