

Name: \_\_\_\_\_

## Population Projections

Population projections are simply mathematical formulas that use current populations and rates of growth to estimate future populations. Many equations are used to project future populations. A basic equation is  $N_t = P e^{(r * t)}$ . "Nt" represents the number of people at a future time. "P" is the population at the beginning time. "e" is the base of the natural logarithms (2.71828). "r" is the rate of increase (natural increase divided by 100). "t" represents the time period involved.

The best way to explain this is by example. In 2011, Nigeria had a population of 162.3 million people. The rate of natural increase is 2.5. We want to predict the future population for the year 2030. We take 2.71828 (e) raised to the power of 0.025 (r), times 19 (t). Therefore, e raised to the power of r multiplied by t is equal to 1.6080. Multiplying 162.3 by 1.6080 equals 260.97. Therefore, in 2030, the population for the country of Nigeria is projected to be 260.97 million people. This is an increase of 98.67 million people in 19 years.

$$N_t = P e^{r * t}$$

# of people at a future time = Present Population \* (base of the natural logarithms raised to (rate of natural increase /100 \* time period))

### Perform the following calculations:

**Answer**

1) What will be the population of Nigeria in 2031?

$$r * t = \underline{.5} \quad (20 * 0.025) \quad (2.71828^{.5}) * 162.3 \quad \underline{267.5873722}$$

2) How many people will Brazil add by 2035?

$$196.7 \quad 0.9 \quad 24 * 0.009 = .216 \quad (2.71828^{.216}) * 196.7$$

Population in 2035 = 244 47.42480248

3) How many people will Sweden add by 2040?

$$9.4 \quad 0.3 \quad 29 * .003 = 0.087 \quad (2.71828^{.087}) * 9.4$$

Population in 2040 = 10.25442819 - 9.4 = 0.854428189

4) What will be the population of Germany in 2025?

$$-0.002 * 14 = -0.028 \quad (2.71828^{-0.028}) =$$

$e^{r * t} = \underline{0.972388385} \quad (81.8 * 0.972388385) = \underline{79.54136989}$