Continuously Compounding Practice

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. The population of a city can be modeled by P = 125,000e0.02t, where t is the number of years since 1900.

* 1. What was the population in the year 2000?
	2. What is the population of the city today?
1. The growth of a certain type of bacteria can be modeled by the equation y = 250e.046t, where to represents the number of hours.
	1. How many bacteria will be present after 6 hours?
	2. How many bacteria will be present after 10 days?

**Compound Interest Formula Continuous Compound Interest**

$y=a(1+\frac{r}{n})^{t∙n}$$y=p(e)^{r∙t}$

**Growth Formula Decay Formula**

$y=a(1+r)^{t}$$y=a(1-r)^{t}$

**y = final amount p and a = starting amount r = interest rate (in decimal form)**

**t = time n = # times the money will be compounded each year**

1. What great luck! You have won $18,000 with a winning lottery ticket, You want to invest your money with one of these financial institutions. Which option will give you the greatest balance if they all promise “continuous compounding”?

|  |  |
| --- | --- |
| Bank A will pay you interest at a rate of 6½% if you leave your money for 10 years. | Bank B will pay you interest at a rate of 6.35% if you leave your money for 8 years. |
| Bank C will pay you interest at a rate of 8% if you leave your money for 30 years | Bank D will pay you interest at a rate of 7.12% if you leave your money for 20 years. |

1. So you have bed bugs? If you start with 10 bedbugs and the infestation increases at an average rate of 67% each week, how many bedbugs will you expect to have at the end of the year?
2. The bank of Hybart is advertising 3.25% interest compounded continuously. If you invest your $15,000 you found on the sidewalk, how much money would you have at the end of 10 years?
3. You have finally saved the $28,000 you needed to put a down payment on a new Tesla car. If your money has been in an account that paid 6% interest compounded monthly for the last 10 years, how much money did you initially invest?
4. A $500 Xbox OneX is estimated to lose its value at a rate of approximately 13.2% each year. What will its value be after 10 years?