Name _____ Date _____Period _____

WS 5-5 - Exponential growth and decay

State whether the formula models growth or decay.

1. $y = 3^x$
2. $y = 0.25^x$
3. $f(x) = 1.01^x$
4. $y = 0.033^x$
5. $y = 5^x$
6. $y = \left(\frac{1}{4}\right)^x$
7. $y = \left(\frac{21}{22}\right)^x$
8. $y = \left(\frac{1056}{165}\right)^x$
9. $y = 0.5^x$
10. $y = 1.003112^x$
11. $y = 19237.034^x$
12. $y = \left(\frac{5}{4}\right)^x$
13. $y = 0.0000000001^x$
14. $y = 1.00001^x$
15. $y = 0.999999999999999999^x$
16. $y = \left(\frac{16}{3}\right)^x$

Determine the appropriate rate for each growth or decay rate.

17. 5% growth
18. 12% decay
19. 30% growth
20. 98% decay
21. 1% decay
22. 300% growth
23. 0.85% growth
24. 2.5% decay
25. Tripling
26. Halving
27. 33% decay
28. 0.5% growth
29. 0.9999% decay
30. 4.5% decay
31. 22% growth
32. 0.01% decay

Growth / Decay	Compound Interest
$y = a(1 + r)^t$	$A = P(1 + \frac{r}{n})^{nt}$

33. Find a bank account balance if the account starts with $100, has an annual rate of 4%, and the money left in the account for 12 years.

34. In 1985, there were 285 cell phone subscribers in the small town of Centerville. The number of subscribers increased by 75% per year after 1985. How many cell phone subscribers were in Centerville in 1994?

35. Bacteria can multiply at an alarming rate when each bacteria splits into two new cells, thus doubling. If we start with only one bacterium which doubles every hour, how many bacteria will we have by the end of one day?

36. The population of Eagle Mountain, Utah, can be modeled by $P = 2157(1.258)^t$ where *t* is the number of years since 2000.
    a. What was the population in 2000?

    b. By what percent did the population increase by each year?

    c. What is the current population in Eagle Mountain?

37. You have inherited land that was purchased for $30,000 in 1960. The value of the land increased by approximately 5% per year. What is the approximate value of the land in the year 2011?

38. An adult takes 400 mg of ibuprofen. Each hour, the amount of ibuprofen in the person's system decreases by about 29%. How much ibuprofen is left after 6 hours?

39. You deposit $1600 in a bank account. Find the balance after 3 years for each of the following situations:
    a. The account pays 2.5% annual interest compounded monthly.

    b. The account pays 1.75% annual interest compounded quarterly.

    c. The account pays 4% annual interest compounded yearly.

40. You drink a beverage with 120 mg of caffeine. Each hour, the caffeine in your system decreases by about 12%. How long until you have 10mg of caffeine?