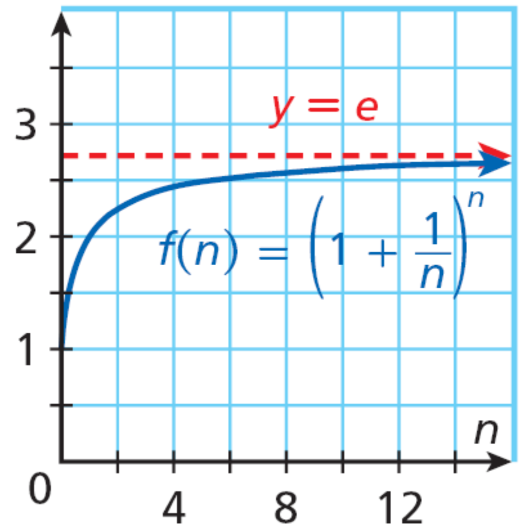
Name ______________________________

Date __________ Per. _____

The Natural Base, e

The *compound interest formula* $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where *A* is the amount, *P* is the principal, *r* is the annual interest, *n* is the number of times the interest is compounded per year and *t* is the time in years.

Suppose that $1 is invested at 100% interest (*r* = 1) compounded *n* times for one year as represented by the function $f(n) = P\left(1 + \frac{1}{n}\right)^{n}$.



As *n* gets very large, interest is *continuously compounded*. Examine the graph of $f(n) = P\left(1 + \frac{1}{n}\right)^{n}$. The function has a horizontal asymptote. As *n* becomes infinitely large, the value of the function approaches approximately 2.7182818…. This number is called _____. Like π, the constant _____ is an irrational number.

Exponential functions with _____ as a base have the same properties as the other exponential functions you have studied.

A logarithm with a base of *e* is called a ______________________________ and is abbreviated as "_____" (rather than as $\log_e$). ______________________________ have the same properties as other logarithms with other bases.

The **natural logarithmic function** *f*(*x*) = ln *x* is the ____________________ of the natural exponential function *f*(*x*) = e^x.