4.1 - CONTINUOUS COMPOUND INTEREST

An application of the exponential function to business.

I. Definition of the number e:

$$e = \lim_{n \to \infty} \left(1 + \frac{1}{n}\right)^n$$

Recall: $$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

Experiment: Let P = \$100, r = .06 and t = 2.

annually:	n = 1	A = \$112.36
semiannually:	n = 2	A = \$112.55
quarterly:	n = 4	A = \$112.65
monthly:	n = 12	A = \$112.72
weekly:	n = 52	A = \$112.74
daily:	n = 365	A = \$112.75
hourly:	n = 8760	A = \$112.75

So, as n approaches infinity, using the definition of e above and a proof from higher calculus, we have the formula for continuous compound interest:

$$A = P\,e^{rt}$$

So, for our experiment,

Example: Find the interest rate needed for an investment of \$5000 to grow to \$6000 in 3 years if interest is compounded continuously.

4.1 HW # 1 – 9 (odd), 17 - 27 (odd)