

Example 3

You deposit \$5500 in an account that pays 3.6% annual interest. Find the balance after 2 years if interest is compounded with the given frequency.

a.) semiannually $\leftarrow 2$

$$A = 5500 \left(1 + \frac{0.036}{2}\right)^{2t}$$

$$A = 5,500 \left(1 + \frac{0.036}{2}\right)^{2 \cdot 2}$$

$$A = \$5906.82$$

b.) monthly $n=12$

$$A = 5500 \left(1 + \frac{0.036}{12}\right)^{12t}$$

$$A = 5500 \left(1 + \frac{0.036}{12}\right)^{24}$$

$$= \$5909.97$$

Section 3 – Use Functions Involving e

e is the # of the proportional growth \rightarrow exists in reality just like π

n	10^1	10^2	10^3	10^4	10^5	10^6
$\left(1 + \frac{1}{n}\right)^n$	2.59374	2.70481	2.71692	2.71815	2.71827	2.71828

As n gets bigger and bigger (approaches ∞), $\left(1 + \frac{1}{n}\right)^n$ approaches 2.718281828. This number is called natural base or Euler's number and is denoted e .

Example 1

Simplify the expression.

a.) $e^9 \cdot e^6$

$$e^{15}$$

b.) $\frac{60e^8}{12e^3}$

$$5e^5$$

c.) $(-10e^{-5x})^3$

$$-1000e^{-15x}$$

$$\frac{-1000}{e^{15x}}$$

Example 2

Use a calculator to evaluate the expression.

a.) e^6

$$403.429$$

b.) $e^{0.28}$

$$0.76$$

c.) $e^{3/4}$

$$2.12$$

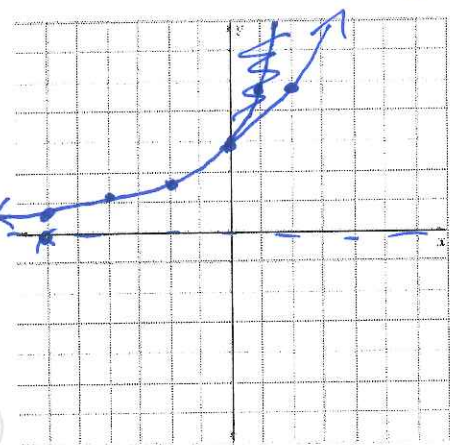
Example 3

Graph each exponential function. State the domain and range.

a.) $y = 3e^{0.25x}$

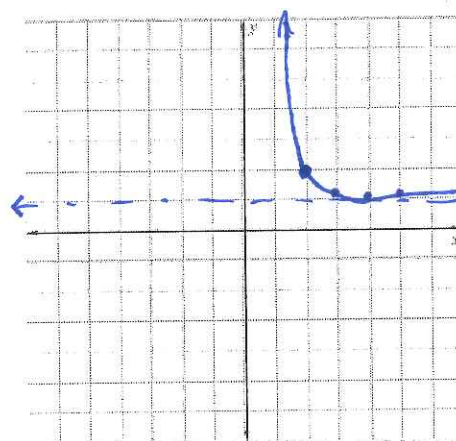
x	y
-6	.67
-4	1.1
-2	1.82
0	3
2	4.95

D: $(-\infty, \infty)$
R: $(0, \infty)$



b.) $y = e^{-7.54(x-2)} + 1$

x	y
1	1882.83
2	2
3	1.00054
4	1
5	1



D: $(-\infty, \infty)$
R: $(1, \infty)$

You learned before that the balance of an account earning compound interest is given by $A = P\left(1 + \frac{r}{n}\right)^{nt}$.

As the frequency n of compounding approaches positive infinity, the compound interest formula approximates the following formula:

Continuously Compounded Interest

$A = Pe^{rt}$

$A =$ amount in account

$P =$ principal

$r =$ annual interest rate

$t =$ time

Example 4

a.) You deposit \$3000 in an account that pays 3.5% annual interest compounded continuously. What is the balance after 3 years?

$A = 3000 e^{(0.035)(3)}$
 $= \$3,332.13$

b.) You deposit \$2500 in an account that pays 5% annual interest compounded continuously. Find the balance after each amount of time.

$A = 2500 e^{(0.05)t}$

i.) 2 years

$\$2,762.93$

ii.) 5 years

$\$3,210.06$

iii.) 7.5 years

$\$3,637.48$