7.3: Using Functions Involving e

$\left(1+\frac{1}{n}\right)^n$

The natural base e: Euler's Constant

$e \approx 2.71828\ldots$

PART 1: Simplifying the Expression

a) $e^2 \cdot e^5$

$e^{2+5} = \boxed{e^7}$

b) $\frac{12e^4}{3e^3}$

$\boxed{4e}$

c) $(5e^{-3x})^2$

$5^2 e^{-6x}$

$\boxed{\frac{25}{e^{6x}}}$

PART 2: Evaluating e with a calculator (round to 3 d.p.)

a) e^4

54.598

b) $e^{-0.09}$

$2.71\ldots^{-0.09}$

$\frac{1}{2.71^{.09}}$

$\boxed{0.913}$

c) $e^{3/4} \Rightarrow \sqrt[4]{e^3}$

$\boxed{2.117}$

PART 3: graphing w/ e

$\boxed{y = ae^{rx}}$

- $a > 0$, $r > 0$ $\Rightarrow$ Exponential growth
- $a > 0$, $r < 0$ $\Rightarrow$ Exponential decay

growth or decay?

a) $y = 2e^{0.5x}$

b) $y = \frac{1}{2}e^{-x} + 1$

c) $1.5e^{0.25(x-1)}$

$r = 0.5$ growth

$r = -1$ decay

$r = .25$ growth

PART 4 Continuously Compounded Interest

$A = Pe^{rt}$

r: rate (decimal)

t: time

A: amount

P: principal

Ex: You deposit $4000 in an account that pays 6% annual interest compounded continuously. (0.06)

a) Balance after 1 year?

$A = Pe^{rt}$

$A = 4000e^{.06(1)}$

$\$4247.35$

b) Balance after 5 years? ($t = 5$)

$\$5,399.44$