Sec 41.2

-Exponential Applications-

-population growth and loss
-depreciation (vehicles, equipment)
-appreciation (inflation, salary)
-radioactive decay
-decay of medicinal substances in the body
-account growth (money invested in savings, cds)

The equation $P = 7.6(1.0109)^t$ models the world's present population, in billions, where t is years since 2018. What is the world population today; what will it be in 2025? 2021

Let $t = 3$

$$P = 7.6(1.0109)^3$$

$$\approx 7.85 \text{ billion}$$

Let $t = 7$

$$P = 7.6(1.0109)^7$$

$$\approx 8.199 \text{ billion}$$

8,199,000,000

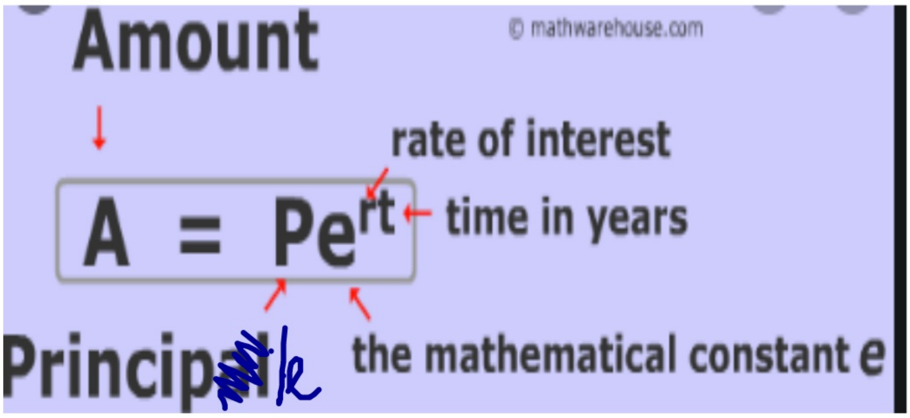
If your home is worth \$250,000 and the inflation rate is 2.5%, how much will your home be worth in 15 years?
Use the model

$.025$

$S = C(1+r)^t$, where C is the current value, r is the inflation rate and S is the value after t years.

$$S = C(1+r)^t$$
$$= 250{,}000(1.025)^{15}$$
$$\approx \$362{,}074$$

For the scenario on the next screen we will use the Pert formula.



Euler
≈ 2.71

e
$\boxed{\div}$

It calculates the amount of money acculumated if it's compounded continuously.

e^x
$\boxed{\ln}$

We'll also use the compound interest formula.

Amount

rate of interest

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

time in years

Principal

number of times per year, interest is compounded

It obtains the later amount if interest is compounded more than once a year, but not continuously.

You are investing $8000 for 6 years. One account pays 7%, compounded monthly. The other pays 6.85%, compounded continuously. Which is the better investment?

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

$$=8000\left(1+\frac{.07}{12}\right)^{12(6)}$$

$$\approx \$12160.8$$

better

$$A=Pe^{rt}$$

$$=8000e^{.0685(6)}$$

12066.6

annually- 1

semi-annually- 2

quarterly- 4

monthly- 12

daily- 365

continuously-

Amount

rate of interest

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

time in years

Principal

number of times per year, interest is compounded

Amount

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rate of interest

$$\boxed{A = Pe^{rt}}$$

time in years

Principal

the mathematical constant *e*

various "n" values

Suggested Practice
Sec 4.1
page 452-453

53,55,65,66,67,73

53. a. \$13,116.51
b. \$13,140.67
c. \$13,157.04
d. \$13,165.31

55. 7%, monthly

65. a. 574 million
b. 1148 million
or 1,148,000,000
or 1.1 trillion

66. f(80) = 157.49
so, no, not safe in 2066

67. \$832,744

73. a. 100%
b. 68.5%
c. 30.8%
d. 20%