

pp. 28-29 Compound Interest

7.1

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Warm-up:

exp. growth

If an amount of \$5,000 is deposited into a savings account at an annual interest rate of 5%, what is the value of the investment after 10 years?

$$y = 5000(1 + 0.05)^{10}$$

$$y = \$8,144.47$$

Compound Interest

Compound Interest: Interest paid on the initial investment (called the principal) and on any previous interest.

Interest is usually compounded more than once a year.

Formula for Compound Interest

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

n = number of times compounded per year

Example: You deposit \$1000 in a bank account that pays 8% annual interest. Find the balance after two years if you compound the interest.

a) Annually $n = 1$ $y = 1000(1 + \frac{0.08}{1})^{(1 \cdot 2)}$ $y = \$1,166.40$

b) Quarterly $n = 4$ $y = 1000(1 + \frac{0.08}{4})^{(4 \cdot 2)}$ $y = \$1,171.66$

c) Monthly $n = 12$ $y = 1000(1 + \frac{0.08}{12})^{(12 \cdot 2)}$ $y = \$1,172.89$

Continuous Compounded Interest

With continuously compounded interest, you are constantly earning interest and the interest keeps earning on the previous interest.

Formula for Continuous Compounded Interest

$$y = Pe^{rt}$$

Example: You deposit \$1000 in a bank account that pays 8% annual interest. Find the balance after three years if the interest is compounded continuously.

An amount of \$1,500.00 is deposited in a bank paying an annual interest rate of 4.3%, compounded quarterly. What is the balance after 6 years?

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Formula:

$$y = 1500.00 \left(1 + \frac{.043}{4} \right)^{(4 \cdot 6)}$$

$$y = \$1,938.84$$

Answer:

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4. You deposit \$2500 in an account that pays 15% annual interest. Find the balance after 3 years if the interest is compounded:

a. Continuously

b. Quarterly

c. Daily

5. You deposit \$100 in an account that pays 3% annual interest. Find the balance after 50 years if the interest is compounded:

Annually

$$y = 100 \left(1 + \frac{.03}{4} \right)^{(4 \cdot 50)}$$

b. Quarterly

$$y = \$445.67$$

c. Continuously

Practice time: Homework worksheet

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