Exercise 306

The amount A accumulated after 1000 dollars is invested for t years at an interest rate of 4% is modeled by the function $A(t) = 1000(1.04)^t$.

a. Find the amount accumulated after 5 years and 10 years.

b. Determine how long it takes for the original investment to triple.

Solution

Part (a)

Plug in $t = 5$ and $t = 10$ to the formula and use a calculator.

$$A(5) = 1000(1.04)^5 \approx 1216.65$$

$$A(10) = 1000(1.04)^{10} \approx 1480.24$$

After 5 years the investment will be worth \$1216.65, and after 10 years the investment will be worth \$1480.24.

Part (b)

Triple the amount of \$1000 is \$3000.

$$A(t) = 1000(1.04)^t$$

$$3000 = 1000(1.04)^t$$

Divide both sides by 1000.

$$3 = (1.04)^t$$

Take the natural logarithm of both sides.

$$\ln 3 = \ln(1.04)^t$$

Use the property of logarithms that allows the exponent of the argument to be brought down in front.

$$\ln 3 = t \ln 1.04$$

Solve for t by dividing both sides by $\ln 1.04$.

$$t = \frac{\ln 3}{\ln 1.04} \approx 28.01$$

Therefore, it will take about 28 years for the original investment to triple in value.