Bell Work:

An amount of \$2,340.00 is deposited in a bank paying an annual interest rate of 3%, compounded continuously. $A = Pe^{rt}$
Find the balance after 3 years.

$A = 2340e^{.03(3)}$
$= 2340e^{.09}$
$= 2340(1.094174284) = \$2560.37$

Task

A man invests $1000 in an account with a 5% annual interest rate. He knows that money in an account where interest is compounded semi-annually will earn interest faster than money in an account where interest is compounded annually. He wonders how much interest can be earned by compounding it more and more often. In this problem we investigate his question.

If the man's interest is compounded annually, his year-end balance will be:

$$\begin{aligned} \$1000 + 5\% \times \$1000 &= \$1000 + 0.05 \times \$1000 \\ &= \$1000(1 + 0.05) \\ &= \$1050 \end{aligned}$$

If his interest is compounded semi-annually, he earns half the annual interest at mid-year, and his mid-year balance is:

$$\$1000 + \frac{5\%}{2} \times \$1000 = \$1000 + \frac{0.05}{2} \times \$1000$$
$$= \$1000\left(1 + \frac{0.05}{2}\right)$$
$$= \$1025$$

At year-end he earns the other half of his annual interest and his year-end balance is:

$$\$1025 + \frac{5\%}{2} \times \$1025 = \$1025 + \frac{0.05}{2} \times \$1025$$

$$= \$1025\left(1 + \frac{0.05}{2}\right) = 1050.625$$

$$= \$1000\left(1 + \frac{0.05}{2}\right)\left(1 + \frac{0.05}{2}\right)$$

$$= \$1000\left(1 + \frac{0.05}{2}\right)^2$$

$$= \$1050.625$$

Assignment: Complete Parts a - f on your own paper.

a) $1000\left(1+\frac{.05}{4}\right)^4 \rightarrow$ b)

$1000(1+.0125)^4$

$1000(1.0125)^4$

$1000(1.050945337)$

$\$1050.95$