

4.7 PreExam: Exponential Functions and Compound Interest

Construct an exponential function symbolically given a description of the relationship F.LE.2.ii

Compound interest formula:

$$FV = PV \times \left(1 + \frac{r}{100k}\right)^{kn} \text{ where FV is the future value,}$$

PV is the present value, n is the number of years,

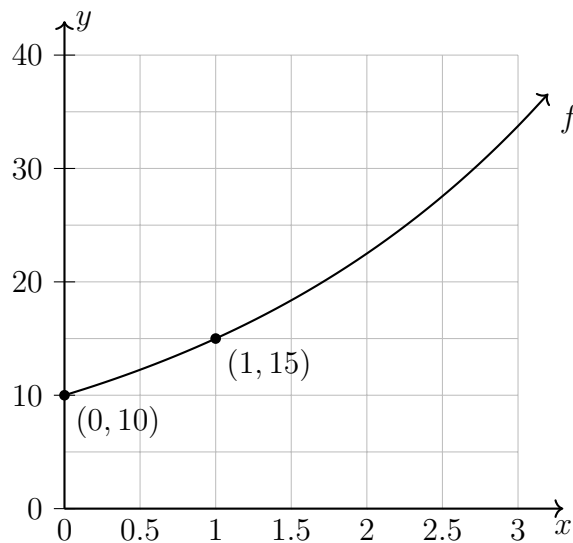
k is the number of compounding periods per year,

$r\%$ is the nominal annual rate of interest

1. Write down the formula for a function $f(x)$ that increases 15% for each increase of 1 in input value x .
2. The price of a share of stock in a particular company is \$2.25 per share in 2010. Assume that it increases in value by 6% annually thereafter.
 - (a) Write an equation representing the value of the stock $P(t)$, in dollars, t years after 2010.
 - (b) What does $P(30)$ represent in this context?
3. An investment of \$5,000 compounds monthly with an annual interest rate of 4%.
 - (a) How many compounding periods are there per year?
 $k =$
 - (b) First write the formula for, and then calculate, the account balance of principal and interest after three years.

4. The graph shows the exponential function $f(x)$.

- (a) Write down the initial value of the function.
- (b) By what factor do the values of f increase each time x increases by 1?
- (c) By what factor would f increase when the input increases by 10?



5. A company depreciates a piece of equipment which was purchased in 2022 at a constant annual rate. The equation representing the value of the equipment $V(t)$, in dollars, t years after 2022 is $V(t) = 12,000 \times (0.85)^t$.

- (a) Write down the initial value of the equipment.
- (b) What does the value 0.85 tell us about the situation?
- (c) By what percent does the equipment's value decrease each year?
- (d) Sketch the graph of the function.

