28. The tables of values below correspond to an exponential function with a rule of the form $y = ac^x$. Find the rule of each function.

a)

x	0	1
y	$\frac{1}{2}$	$\frac{3}{2}$

$y = \frac{1}{2}(3)^x$

b)

x	0	−1
y	2	8

$y = 2\left(\frac{1}{4}\right)^x$

c)

x	0	2
y	−3	−12

$y = -3(2)^x$

d)

x	0	−2
y	−4	−9

$y = -4\left(\frac{2}{3}\right)^x$

29. Each of the following situations is described by an exponential function of the form $y = ac^{bx}$. After establishing the unit of time,

1. define the variables x and y. 2. determine the parameters a, b and c. 3. find the rule of the function.

a) In a controlled environment containing 1000 bacteria initially, the number of bacteria triples every 10 minutes.

1. *x: number of elapsed hours since the beginning, y: number of bacteria*

2. $a = 1000, b = 6, c = 3$ 3. $y = 1000(3)^{6x}$

b) In an environment initially containing 100 insects, the number of insects doubles every 3 days.

1. *x: number of elapsed days since the beginning, y: number of insects*

2. $a = 100, b = \frac{1}{3}, c = 2$ 3. $y = 100(2)^{\frac{1}{3}x}$

c) A car bought for \$30 000 loses 20% of its value every year.

1. *x: number of elapsed years since the purchase, y: value of the car*

2. $a = 30\,000, b = 1, c = 0.80$ 3. $y = 30\,000(0.80)^x$

d) An initial population of 1000 deer increases by 15% each year.

1. *x: number of elapsed years since the beginning, y: deer population*

2. $a = 1000, b = 1, c = 1.15$ 3. $y = 1000(1.15)^x$

e) A radioactive mass of 50 g loses half of its mass each period of 6 hours starting at noon.

1. *x: number of elapsed hours since noon, y: remaining mass*

2. $a = 50;\ b = \frac{1}{6},\ c = \frac{1}{2}$

3. $y = 50\left(\frac{1}{2}\right)^{\frac{x}{6}}$

f) An initial population of 100 birds increases by 15% every 2 years.

1. *x: number of elapsed years since the beginning, y: bird population*

2. $a = 100,\ b = \frac{1}{2},\ c = 1.15$

3. $y = 100(1.15)^{\frac{x}{2}}$

30. A capital c_0 is invested at a fixed annual interest rate i compounded n times per year. The accumulated capital $c(t)$ after t years is given by the formula

$$c(t) = c_0\left(1 + \frac{i}{n}\right)^{nt}.$$

a) Establish the rule of the function $c(t)$ that gives the accumulated capital of \$1000 invested at a 6% interest rate compounded

1. annually. $C(t) = 1000\ (1.06)^t$
2. every 6 months. $C(t) = 1000(1.03)^{2t}$
3. each month. $C(t) = 1000(1.005)^{12t}$
4. each day. $C(t) = 1000\left(1 + \frac{0.06}{365}\right)^{365t}$

b) Calculate the accumulated capital after 5 years in each of the preceding cases.

1. \$1338.23
2. \$1343.92
3. \$1348.85
4. \$1349.83