9.2

Exponential Growth and Decay.

Identify the initial amount a and the growth factor b in each exponential function.

1) $f(x) = 3 \cdot 5^x$

$a = 3 \quad b = 5$

2) $y = 250 \cdot 1.065^x$

$a = 250 \quad b = 1.065$

3) $g(t) = 3.5^t$

$a = 1 \quad b = 3.5$

4) $h(x) = 5 \cdot 1.02^x$

$a = 5 \quad b = 1.02$

5) $f(x) = 2 \cdot 3^x$

$a = 2 \quad b = 3$

6) $y = 5 \cdot 1.06^x$

$a = 5 \quad b = 1.06$

7) $g(t) = 6^t$

$a = 1 \quad b = 6$

8) $h(x) = -3 \cdot 2^x$

$a = -3 \quad b = 2$

Find the balance in each account after the given period.

9) \$ 8000 principal earning 5% compound annually, after 6yrs.

$y = ab^x$

$y = 8000 \cdot 1.05^6$

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

$A = 800\left(1+\frac{5\%}{1}\right)^{(1)(6)}$

$A = 800\,(1+0.05)^6$

$A = 800\,(1.05)^6$

10,720.80

10) $2000 principal earning 5.4% compounded annually, after 4 years.

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

$$A = 2000\left(1+\frac{5.4\%}{1}\right)^{1(4)}$$

$$A = 2000\left(1+.054\right)^{4}$$

$$A = 2000\left(1.054\right)^{4}$$

$$A = 2468.27$$

11) $500 principal earning 4% compounded quarterly, after 10 years.

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

$$A = 500\left(1+\frac{4\%}{4}\right)^{4(10)}$$

$$A = 500\left(1+\frac{.04}{4}\right)^{40}$$

$$A = 744.43$$

12) $6500 principal earning 2.8% compounded monthly, after 2 years.

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

$$A = 6500\left(1+\frac{2.8\%}{12}\right)^{12(2)}$$

$$A = 6500\left(1+\frac{.028}{12}\right)^{24}$$

$$A = 6873.94$$

13) \$ 3000 principal earning 4% compound annually, after 6 years.

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

$$A = 3000\left(1+\frac{4}{1}\right)^{1(6)}$$

$$A = 3000\,(1+.04)^{6}$$

$$A = 3000\,(1.04)^{6}$$

$$A = 3795.96$$

14) \$5000 principal earning 16% compound monthly, after 10 yrs.

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

$$A = 5000\left(1+\frac{10\%}{12}\right)^{(12)(10)}$$

$$A = 5000\left(1+\frac{.10}{12}\right)^{120}$$

$$A = 13{,}535.2$$

State whether the equation represents exponential growth, exponential decay, or neither.

15) $y = 0.82 \cdot 3^{x}$

exponential growth

16) $f(x) = 5 \cdot 0.3^{x}$

exponential decay.

17) $f(x) = 18 \cdot x^{2}$

neither

18) $y = 0.9^{x}$

exponential decay.

19) The town manager reports that revenue for a given year is \$ 2.5 million. The budget director predicts that revenue will increase by 4% per year. If the director's prediction holds true, how much revenue will the town ~~will~~ have available 10 years from the date of the town manager's report?

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

$$A = 2500,000\left(1+\frac{4\%}{12}\right)^{12(10)}$$

$$A = 2500,000\left(1+\frac{.04}{12}\right)^{120}$$

$$A = 3.7 \text{ million}$$

20) A wildlife manager determines that the function $y = 200 \cdot 1.07^x$ represents the deer population at a state park, x years after the population is first counted. Graph the function, identifying the y-intercept and asymptote. What is the meaning of the y-intercept in this situation?

The y intercept is 200 and the asymptote is $y = 0$

The y-intercept of 200 means that ~~there~~ were 200 deer present in the park when the deer population was first counted.