

Exponential Functions

Find the exponential function that goes through the two given points

<p>1. (0, 40) and (5, 100)</p> $100 = f(x)$ $x = 5 \quad 100 = 40b^5$ $a = 40 \quad 2.5 = b^5 \quad b = 1.201$ $f(x) = 40(1.201)^x$	<p>2. (0, 200) and (10, 25)</p> $f(x) = 25 \quad 25 = 200b^{10}$ $x = 10 \quad .125 = b^{10}$ $a = 200 \quad .125 = b^{10}$ $f(x) = 200(.812)^x$
<p>3. (2, 150) and (8, 15)</p> $150 = ab^2$ $15 = ab^8$ $a = \frac{150}{b^2}$ $15 = \frac{150}{b^2} b^8$ $15 = 150b^6$ $\frac{15}{150} = b^6$ $.1 = b^6$ $.681 = b$ $\frac{150}{(.681)^2} = a$ $a = 323.442$ $f(x) = 323.442(.681)^x$	<p>4. (4, 10) and (9, 250)</p> $10 = ab^4$ $250 = ab^9$ $a = \frac{10}{b^4}$ $250 = \frac{10b^9}{b^4}$ $250 = 10b^5$ $25 = b^5$ $b = 1.904$ $\frac{10}{(1.904)^4}$ $.761$ $f(x) = .761(1.904)^x$

5. In \$4000 is deposited in an account that is compounded monthly at a rate of 5.25% what will the value of the account be after 4 years?

$a = 4000 \quad t = 4$
 $r = .0525$
 $k = 12$

$4000 \left(1 + \frac{.0525}{12}\right)^{12 \cdot 4}$
 $4000(1.004375)^{48}$

a. 4908.5	b. 4934.71	c. 4932.45
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6. In \$2500 is deposited in an account that is compounded continuously at a rate of 8% what will the value of the account be after 36 months?

$2500e^{(.08 \cdot 3)}$

time is always in years when it comes to money! APR

a. 3175.59	b. 3149.28	c. 3178.12
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7. A group of birds are relocated to a new island, if there are 60 birds to start and they are projected to increase in population by 14% every 4 months, how many birds will there be in 2 years?

$$60(1.14)^6$$

$$\begin{aligned} a &= 60 \\ r &= .14 \\ t &= 6 \end{aligned}$$

a. 137	b. 139	c. 132
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8. In \$1100 is deposited in an account that is compounded continuously at a rate of 10.25% what will the value of the account be after 18 months?

$$1100e^{(.1025 \cdot 1.5)}$$

$$\begin{aligned} 18 \text{ months} &= 1.5 \text{ years} \\ 1100 &= a \\ \text{rate} &= .1025 \end{aligned}$$

$$18 = \text{APR} = \text{years}$$

a. 1282.82	b. 1273.39	c. 1281.98
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9. If an element decays at a constant rate of 1.5% per day, if you start with 4000 grams how many grams will be left after 6 weeks?

$$\begin{aligned} a &= 4000 \\ r &= -.015 \\ t &= 42 \end{aligned}$$

$$f(42) = 4000(.985)^{42}$$

a. 2120.224	b. 2129.528	c. 2130.367
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10. If a company is offering an additional 8% discount each week on a piece of machinery worth 15,000 how much will the machine be worth in 5 months?

$$\begin{aligned} a &= 15000 \\ r &= .08 \\ t &= 20 \end{aligned}$$

$$f(20) = 15000(.92)^{20}$$

a. 3012.27	b. 2830.40	c. 3028.45
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11. If the leaves fall off a tree at a rate of 5% daily and there are 5000 leaves on a particular tree, how many leaves will be left after 25 days?

$$a = 5000 \quad f(25) = 5000(.95)^{25}$$

$$r = .05$$

$$t = 25 \text{ day}$$

1387 leaves

12. Big\$Balboni an private investing firm offers a CD at 5% compounded quarterly, if you invest \$2500 in this 3 year CD, how much will you have when you are ready to withdraw?

$$a = 2500 \quad f(3) = 2500\left(1 + \frac{.05}{4}\right)^{4 \cdot 3}$$

$$r = .05$$

$$k = 4$$

$$t = 3$$

\$2901.89

13. If there is a huge puddle of water 50 liters is continuously evaporating at a rate of 8% every 8 hours. How much water will be left after 4 days?

$$a = 50$$

$$r = .08$$

$$t = 12$$

$50e^{(-.08 \cdot 12)}$

19.145 liters

14. If on the 15th day of school there have been 465 issued temp ID's and on the 23rd day of school there were 735 temp ID's. Find the exponential function to fit this data. How many temp ID's will have been issued on the 40th day of school? If you can create 4 temp ID's per page of cardstock, how many pages will be needed?

$$(15, 465) \quad 1.581 = b^8$$

$$(23, 735) \quad 1.059 = b$$

$$f(40) = 196.784(1.059)^{40}$$

$$f(40) = 1949$$

$$\frac{1949}{4} = 487.25$$

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488 card stock

$$465 = ab^{15}$$

$$735 = ab^{23}$$

$$a = \frac{465}{b^{15}}$$

$$735 = \frac{465}{b^{15}} b^{23}$$

$$735 = 465 b^8$$

$$\frac{465}{(1.059)^{15}} = 196.784$$

$$f(x) = 196.784(1.059)^x$$

15. If on the 25th day of a year there are 250 registered voters and on the 75th day there were 1250 voters write an exponential function to fit the data. How many voters will there be on the 125th day?

$$(25, 250)$$
$$(75, 1250)$$

$$250 = ab^{25}$$
$$1250 = ab^{75}$$

$$\frac{250}{(1.0327)^{25}}$$

$$111.837 = a$$

$$a = \frac{250}{b^{25}}$$

$$f(x) = 111.837(1.0327)^x$$

$$1250 = \frac{250}{b^{25}} b^{75}$$

$$6242.48 \rightarrow 6243 \text{ voters}$$

$$1250 = 250 b^{50}$$

$$5 = b^{50}$$

$$b = 1.0327$$