7.3 Linear vs. Exponential

Algebra 1

Practice

Identify the type of relationship and create a function from the given information.

1. The alligator population p is currently 30, and every year t the population is 9/7 of the previous year's population.

exponential growth

$p(t)=30\left(\frac{9}{7}\right)^t$

2. In the morning, the temperature T is 45 degrees Fahrenheit and it increases by 4 degrees every hour h until 4:00 p.m.

linear growth

$T(h)=45+4h$

3. There are currently 8 boars roaming around in Mr. Bean's back yard. Each year t, the population p increases by 8.

linear growth

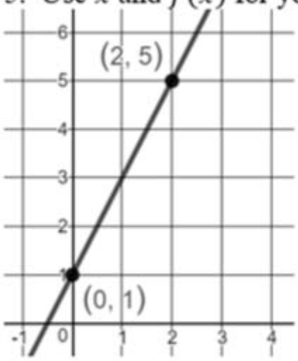
$p(t)=8+8t$

4. There are 100 rodents in a barn. Every month m, the rodent population p increases by 200%.

exponential growth

$p(m)=100(3)^m$

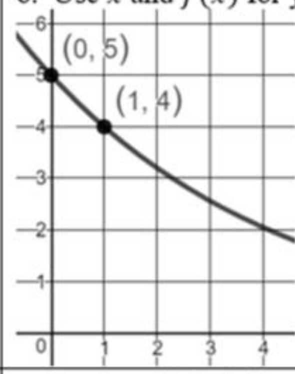
5. Use x and $f(x)$ for your variables.



linear growth

$f(x)=1+2x$

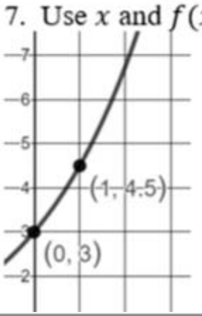
6. Use x and $f(x)$ for your variables.



exponential decay

$f(x)=5\left(\frac{4}{5}\right)^x$

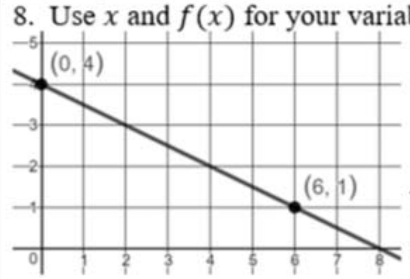
7. Use x and $f(x)$ for your variables.



exponential growth

$f(x)=3(1.5)^x$

8. Use x and $f(x)$ for your variables.



linear decay

$f(x)=4-\frac{1}{2}x$

9.

x	0	1	2	3
$h(x)$	7	9.8	13.72	19.208

$\cdot 1.4$

exponential growth

$h(x)=7(1.4)^x$

10.

h	0	1	2	3
$r(h)$	12	4	$\frac{4}{3}$	$\frac{4}{9}$

$\cdot \frac{1}{3}$

exponential decay

$r(h)=12\left(\frac{1}{3}\right)^h$

11.

t	0	1	2	3
$v(t)$	7	13	19	25

$+6$

linear growth

$v(t)=7+6t$

12.

t	0	1	2	3
$a(t)$	4	1	-2	-5

-3

linear decay

$a(t)=4-3t$

Create a model (equation) for each scenario. Use function notation to answer the question.

13. A population p of 500 people doubles every 35 years t. How many people will there be in 100 years?

$P(t)=500(2)^{t/35}$

$P(100)\approx 3622.89$

14. After a morning coffee, Mr. Brust has 200 mg of caffeine c in his blood. The half-life is 45 minutes m. How much caffeine is in his system after 2 hours and 10 minutes

$C(m)=200\left(\frac{1}{2}\right)^{m/45}$

$c(130)\approx 27$

15. There is 3100 grams g of radioactive material. The half-life of the material is 8,000 years t. How much radioactive material will there be in 10,000 years?

$g(t)=3100\left(\frac{1}{2}\right)^{t/8000}$

$g(10{,}000)\approx 1303.39$

16. A mutual-fund portfolio has a value v of \$1,000 and doubles every 7 years t. How much will the fund be worth in 20 years?

$V(t)=1000(2)^{t/7}$

$V(20)\approx 7245.79$

17. A culture of bacteria has 2,500 cells c that doubles every 3 hours h. How many cells of bacteria will there be in 2 hours?

$c(h)=2500(2)^{h/3}$

$c(2)\approx 3968.5$

18. A species of animal a is being destroyed by a predator. The half-life is 6 months m. If there are 200,000 animals, how many will there be left in 4 years?

$a(m)=200{,}000\left(\frac{1}{2}\right)^{m/6}$

$a(48)\approx 781.25$

19. Find the product of

$$(5p+1)(p-1)$$

$5p^2-5p+p-1$

$\boxed{5p^2-4p-1}$

20.

x	y
0	85
2	75
5	65
7	70
14	52
15	50
20	45
23	37

Find the LINEAR regression equation for the data above.

Equation: $y=-1.89x+80.27$

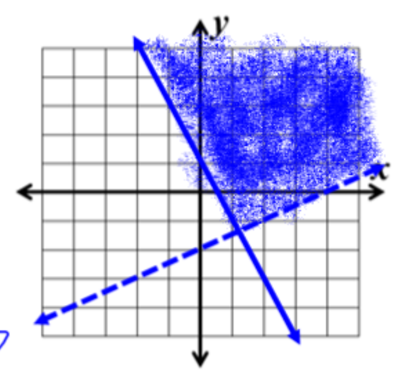
Correlation Coefficient: 0.978

Explain the meaning of the correlation coefficient.

strong negative correlation

21. Graph the following:

$$\begin{cases} y \geq -2x+1 \\ y > \frac{1}{2}x-2 \end{cases}$$



22. Solve: $\frac{x-8}{4}+3=9$

$\frac{x-8}{4}=6$

$x-8=24$

$\boxed{x=32}$