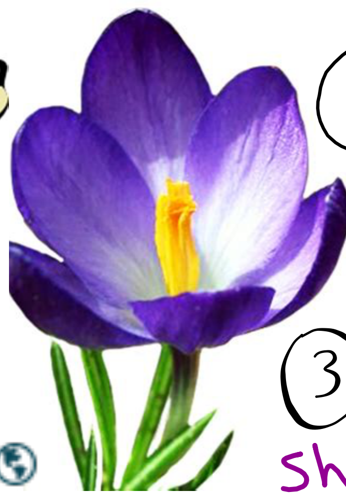
April 15, 2019

1 HW QUESTIONS



2 Pick Up the WARM UP

3 Have record sheet and scored homework out

1. *Suppose the cost of food has been increasing by 4% per year for many years. To find the cost of an item 15 years ago, Heather said, "Take the current price and divide it by 1.04^{15}"*

   Her friend Elissa said, "No, you should take the current price and multiply it by 0.96^{15}!" Explain who is correct and why.

$y = ab^x$

$y = \text{cost}(1.04)^x$

$y = \text{cost}(1.04)^{-15}$

$y = \dfrac{\text{cost}}{(1.04)^{15}}$

Heather is correct!

2. Consider the two points on the normal x-y plane only (2, 9) and (5, 30.375) Using the ***method of substitution*** to determine the equation of the exponential equation in the form $y = ab^x$

x y
(2, 9)

$y = ab^x$

x y
(5, 30.375)

$y = ab^x$

$a = \frac{9}{(1.5)^2} = 4$

$9 = ab^2$ $\quad 30.375 = ab^5$

$a = \frac{9}{b^2}$

$30.375 = (\quad) b^5$

$30.375 = 9 \cdot b^3$

$b^3 = \frac{30.375}{9}$

$\sqrt[3]{\quad} \quad \sqrt[3]{\quad}$

$b = 1.5$

$y = 4(1.5)^x$

$b = 1.5$
$a = 4$

$y = 4(1.5)^x$

$9 = ab^2$ $\quad$ $30.375 = ab^5$

OR

$$\frac{30.375 = ab^5}{9 = ab^2}$$

$$\sqrt[3]{3.375} = \sqrt[3]{b^3}$$

$$\boxed{b = 1.5}$$

$$9 = a(1.5)^2$$

$$a = \frac{9}{(1.5)^2}$$

$$\boxed{a = 4}$$

3. The table at right shows the total population of Mexico for the given years.

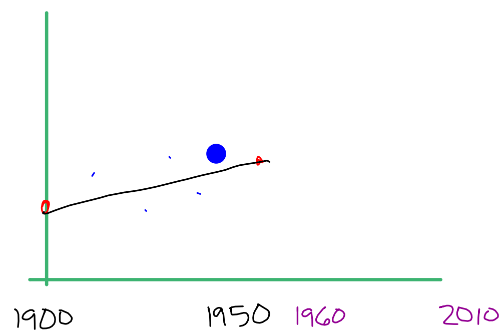
a. What was the average rate of change for the population from 1900 to 1950?

b. What was the average rate of change from 1960 to 2010?

c. When was the population growth rate higher?

April 15, 2019

Year	Population (millions)
1900	13.6
1910	15.2
1920	14.4
1930	16.6
1940	19.8
1950	26.3
1960	35.0
1970	50.7
1980	69.7
1990	87.8
2000	100.3
2010	113.7

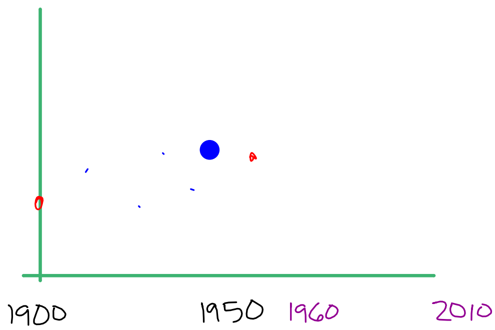


$$\frac{26.3 - 13.6}{1950 - 1900}$$

$$.254 \frac{\text{mil people}}{\text{year}}$$

$$254{,}000 \frac{\text{people}}{\text{year}}$$

Year	Population (millions)
1900	13.6
1910	15.2
1920	14.4
1930	16.6
1940	19.8
1950	26.3
1960	35.0
1970	50.7
1980	69.7
1990	87.8
2000	100.3
2010	113.7



$$\frac{113.7-35}{2010-1960}$$

1.574 mil/year

1,574,000 people/yr

$$\frac{26.3-13.6}{1950-1900}$$

$.254\ \frac{\text{mil people}}{\text{year}}$

April 15, 2019

HW
QUESTIONS

April 15, 2019

25a

25c

$\cancel{x} + a\cancel{x} = b$

b

$\boxed{51}$

① $2x + y - 3z = -12$

② $5x - y + z = 11$

③ $x + 3y - 2z = -1$

Use ① and ② to eliminate y

$$\begin{array}{r} 2x + y - 3z = -12 \\ + \ 5x - y + z = 11 \\ \hline \end{array}$$

A $7x - 2z = -1$

Use ② and ③ to Eliminate y

$3(5x - y + z = 11)$

$x + 3y - 2z = -11$

⇓

$$\begin{array}{r} 15x - 3y + 3z = 33 \\ x + 3y - 2z = -13 \\ \hline \end{array}$$

B $16x + z = 20$

2 by 2 system

A $7x - 2z = -1$

B $16x + z = 20$

Substitution $16x + z = 20$

$z = 20 - 16x$

$7x - 2z = -1$

April 15, 2019

Substition $16x + z = 20$

$$z = 20 - 16x$$

$$7x - 2z = -1$$

$$7x - 2(20 - 16x) = -1$$

$$7x - 40 + 32x = -1$$

$$7x + 32x = 39$$

$$39x = 39$$

$$\underline{x = 1}$$

$$z = 20 - 16(1)$$

$$\underline{z = 4}$$

$$5x - y + z = 11$$

$$5(1) - y + 4 = 11$$

$$9 - y = 11$$

$$-y = 2$$

$$\underline{y = 2}$$

$$\boxed{\text{Solution } (1, 2, 4)}$$

52

b) $200{,}000 = 110{,}000(1.025)^x$ divide by 110,000

$\frac{20}{11} = (1.025)^x$

Use GDC to find intersection between $y = \frac{20}{11}$ and $y = 1.025^x$

$x \approx \boxed{24.2 \text{ years}}$

c) 5% depreciating $y = 182{,}500(.95)^2$

$\approx \$164{,}706.25$

April 15, 2019

12b

(b) $xy^{-2} = \frac{x}{y^2}$

(c) $(xy)^{-2}$

$\frac{1}{x^2y^2}$

(d) $a^3b^4a^{-4}b^6$

$\frac{a^3b^4b^6}{a^4}$

$\boxed{\frac{b^{10}}{a}}$

(a)

$\boxed{14}$ $(-2,0)$ $(0,1)$

a) slope $= \frac{\Delta y}{\Delta x} = \frac{1-0}{0--2} = \frac{1}{2}$

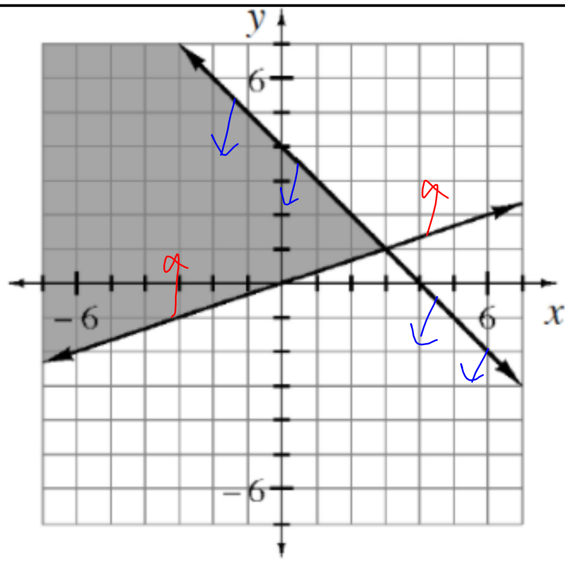
b) slope thats $\perp$ $= \frac{-2}{1}$

c) relationship between slope and $\perp$ slope ?

38

$y = \frac{1}{3}x$

$\geq$



$y = -x + 4$

$\leq$

System of Inequalities

c. The line perpendicular to $y = 2x - 5$ that goes through the point $(1, 7)$.

Perpendicular slope is

$-\frac{1}{2}$

$7 = -\frac{1}{2}(1) + b$

$7 = -\frac{1}{2} + b$

$14 = -1 + 2b$

$2b = 15$

$b = 7.5$

$y = -\frac{1}{2}x + 7.5$

d. The line that goes through the point $(0, 0)$ so that the tangent of the angle it makes with the x-axis is 2.

41c

ⓐ $(x+4)(2x-5)=0$

$x+4=0$ $\quad$ $2x-5=0$

$x=-4$ $\quad$ $x=2.5$

$a \cdot b = 0$

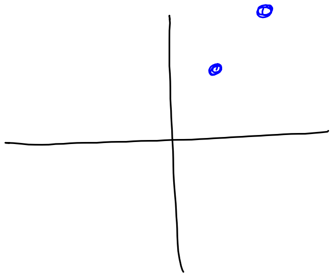
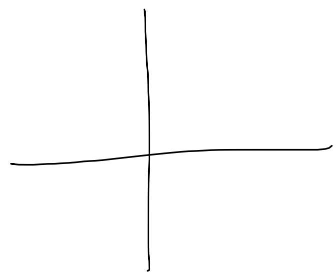
$a \cdot b \cdot c = 0$

$a \cdot b \cdot c \cdot d = 0$

ⓒ $3x(x+1)(2x-7)(3x+4)^2(x-13)(x+7) = 0$

April 15, 2019

$y = ab^x$ $\qquad$ $y = ax^2 + bx + c$

$(2, 9)$ $\quad$ $(5, 30.375)$

Aim

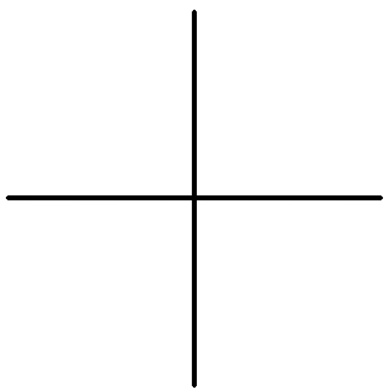
Use 3 by 3 solving skills to help us create quadratic functions.

We'll do (a) as a class

page 274

(1,0) (2,5) (3,12)

$$y = ax^2 + bx + c$$



(1,0) $0 = a(1)^2 + b(1) + c$

(2,5) $5 = a(2)^2 + b(2) + c$

(3,12) $12 = a(3)^2 + b(3) + c$

a b c

A $0 = a(1)^2 + b(1) + c \Rightarrow 0 = a + b + c$

B $5 = a(2)^2 + b(2) + c \Rightarrow 5 = 4a + 2b + c$

C $12 = a(3)^2 + b(3) + c \Rightarrow 12 = 9a + 3b + c$

Eliminate c $A + {}^-1 \cdot B$

A $0 = a + b + c$

B $^-5 = {}^-4a - 2b - c$

① $^-5 = {}^-3a - b$

Eliminate c $C + {}^-1 \cdot B$

A $12 = 9a + 3b + c$

B $^-5 = {}^-4a - 2b - c$

② $7 = 5a + b$

$^-5 = {}^-3a - b$

$7 = 5a + b$

$2 = 2a$

$\boxed{a = 1}$

plug $a = 1$ in eq ②

$7 = 5(1) + b$

$7 = 5 + b$

$\boxed{b = 2}$

plug $a = 1$ and $b = 2$ in eq. A

$0 = (1) + (2) + c$

$0 = 3 + c$

$\boxed{c = {}^-3}$

$y = ax^2 + bx + c$

$\boxed{y = x^2 + 2x - 3}$

$-5 = -3a - b$

$-12 = -8a - 2b$

$y = x^2 + 2x - 3$

Write →

Summary

Finding the Equation of a Parabola Given 3 points

Silently →

In your own words Summarize the process.

I will randomly select 3 students to <u>read</u> what they have written.

B.B.

Practice the method on 64 a

≡ Be organized / Practice good communication.

≡ create separation between sections of your work.

$(3, 10)$ $(5, 36)$ $(-2, 15)$ $y = ax^2 + bx + c$

$$10 = a(3)^2 + b(3) + c$$
$$36 = a(5)^2 + b(5) + c$$
$$15 = a(-2)^2 + b(-2) + c$$

$\Rightarrow$

$$10 = 9a + 3b + c$$
$$36 = 25a + 5b + c$$
$$15 = 4a - 2b + c$$

$(3, 10)$ $(5, 36)$ $(-2, 15)$ $y = ax^2 + bx + c$

$10 = a(3)^2 + b(3) + c \rightarrow 10 = 9a + 3b + c$ I

$36 = a(5)^2 + b(5) + c \rightarrow 36 = 25a + 5b + c$ II

$15 = a(-2)^2 + b(-2) + c \rightarrow 15 = 4a - 2b + c$ III

I $10 = 9a + 3b + c$

II $-1(36 = 25a + 5b + c)$

$^-26 = {}^-16a - 2b$

Eq I + -1(Eq II)

$\boxed{\div 2}$ $^-13 = {}^-8a - b$

II $36 = 25a + 5b + c$

III $-1(15 = 4a - 2b + c)$

$21 = 21a + 7b$

Eq II + -1(Eq III)

$\boxed{\div 7}$ $3 = 3a + b$

$^-13 = {}^-8a - b$

$3 = 3a + b$

$^-10 = {}^-5a$

$\boxed{a = {}^+2}$

plug $a = 2$ into

$3 = 3(2) + b$

$3 = 6 + b$

$b =$

answer to
6-4 a

$y = 2x^2 - 3x + 1$

April 15, 2019

LCQ

Assignment

6.....80-83, 85b, 87bd

April 15, 2019