How many points are required to define a parabola? 3 noncollinear points

Find the equation of the parabola that passes through the given points:

Enter this data into L_1 and L_2 then do a Quadratic Regression:

(-4,-3), (-2,5), (1,8)

L_1	L_2
-4	-3
-2	5
1	8

$y = -.6x^2 + .4x + 8.2$

Another way to find the equation of the quadratic that passes through

(-4,-3), (-2,5), (1,8)

Create a system of equations

$y = ax^2 + bx + c$

(-4,-3)

(-2,5)

(1,8)

$-3 = 16a - 4b + c$

$5 = 4a - 2b + c$

$8 = a + b + c$

$A \quad X = B$

$$\begin{bmatrix} 16 & -4 & 1 \\ 4 & -2 & 1 \\ 1 & 1 & 1 \end{bmatrix} X = \begin{bmatrix} -3 \\ 5 \\ 8 \end{bmatrix}$$

$A^{-1}B$

$$= \begin{bmatrix} -.6 \\ .4 \\ 8.2 \end{bmatrix}$$

a = -0.6
b = 0.4
c = 8.2

To find a Quadratic Equation for the four points below:

(-5, 20), (-3, 24), (-2, 23), (1, 8)

Would it be better to

1. use a graphing calculator and do a Quadratic Regression

or

2. use a graphing caclulator, a system of equations, and matrices?

You can only use 3 points to find the equation of a quadratic using matrices so you'd have to elimnate of the points.... which one and why that one?

You can use all the points when doing a quadratic regression, therefore, this is a better method when you have more than three data points to use.

What if you don't have a graphing calculator at home to do a scatter plot?

1. Use paper and pencil
2. Stay after school and use on in my classroom
3. Use spreadsheet software such as Excel
4. Use the internet

What if you don't have a graphing calculator at home to find a quadratic regression equation?

1. Stay after school and use one in my classroom
2. Use spreadsheet software such as Excel
3. Use the internet

The graph of the function $f(x) = -2x^2 + c$ contains the point (-3,-7).
Find the value of c.

$-7 = -2(-3)^2 + c$

$-7 = -2(9) + c$

$-7 = -18 + c$

$+18 \quad +18$

$11 = c$

You can now finish Hwk #3. Sec 5-1

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Problems 5, 8, 16, 21, 22, 34, 38

Due Tomorrow

$y = ax^2 + bx + c$

Without actually graphing a parabola how can you tell it opens up or opens down?

When $a<0$ the parabola opens DOWN

When $a>0$ the parabola opens UP

How can you tell if a Quadratic has a Maximum or a Minimum without graphing?

If a parabola opens UP the vertex is a Minimum

If the parabola opens DOWN the vertex is a Maximum

Does each Quadratic have a Maximum or a Minimum?

1. $y = -.315x^2 + 3x + 0.57$

a is neg

Opens Down so the vertex is a MAX

2. $f(x) = 0.0912x^2 - 68x - 13$

a is pos

Opens UP so the vertex is a MIN

3. $f(x) = -25x + 3.27x^2 - 178$

a is pos

Opens UP so the vertex is a MIN

4. $y = (3x + 1)(7 - x)$

If you expand this you'll get $-3x^2$ so a will be neg

Opens Down so the vertex is a MAX