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3 Point Equation



<-- Enter Point 1

<-- Enter Point 2

<-- Enter Point 3

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Given the 3 points you entered of
 (150,0), (400,1), and (700,0),
 calculate the quadratic equation
 formed by those 3 points

Calculate Letters a,b,c,d from Point 1

(150, 0):

b represents our x-coordinate of 150

a is our x-coordinate squared $\rightarrow 150^2$
 $= 22500$

c is always equal to 1

d represents our y-coordinate of 0

Calculate Letters e,f,g,h from Point 2

(400, 1):

f represents our x-coordinate of 400

e is our x-coordinate squared $\rightarrow 400^2$
 $= 160000$

g is always equal to 1

h represents our y-coordinate of 1

Calculate Letters i,j,k,l from Point 3

(150, 0):

j represents our x-coordinate of 150

i is our x-coordinate squared $\rightarrow 150^2$
= 22500

k is always equal to 1

l represents our y-coordinate of 0

From those equations, let's pick out the necessary pieces from what you entered and use Cramers's Rule

Step 1, calculate the denominator

Delta (Δ):

$$\Delta = (a * f * k) + (b * g * i) + (c * e * j) - (c * f * i) - (a * g * j) - (b * e * k)$$

$$\Delta = (22500 * 400 * 1) + (150 * 1 * 490000) + (1 * 160000 * 700) - (1 * 400 * 490000) - (22500 * 1 * 700) - (150 * 160000 * 1)$$

$$\Delta = 9000000 + 73500000 + 112000000 - 196000000 - 15750000 - 24000000$$

$$\Delta = -41250000$$

Step 2, calculate the a numerator:

$$a \text{ numerator} = (d * f * k) + (b * g * l) + (c * h * j) - (c * f * l) - (d * g * j) - (b * h * k)$$

$$a \text{ numerator} = (0 * 400 * 1) + (150 * 1 * 0) + (1 * 1 * 700) - (1 * 400 * 0) - (0 * 1 * 160000) - (150 * 1 * 490000)$$

$$1 * 700) - (150 * 1 * 1)$$

$$a \text{ numerator} = 0 + 0 + 700 + 0 + 0 - 150$$

$$a \text{ numerator} = 550$$

Step 3. calculate the b numerator:

$$b \text{ numerator} = (a * h * k) + (d * g * i) + (c * e * l) - (c * h * i) - (a * g * l) - (d * e * k)$$

$$b \text{ numerator} = (22500 * 1 * 1) + (0 * 1 * 490000) + (1 * 160000 * 0) - (1 * 1 * 490000) - (22500 * 1 * 0) - (0 * 160000 * 1)$$

$$b \text{ numerator} = 22500 + 0 + 0 - 490000 + 0 + 0$$

$$b \text{ numerator} = -467500$$

Step 4. calculate the c numerator:

$$c \text{ numerator} = (a * f * l) + (b * h * i) + (d * e * j) - (d * f * i) - (a * h * j) - (b * e * l)$$

$$c \text{ numerator} = (22500 * 400 * 0) + (150 * 1 * 490000) + (0 * 160000 * 700) - (0 * 400 * 490000) - (22500 * 1 * 700) - (150 * 160000 * 0)$$

$$c \text{ numerator} = 0 + 73500000 + 0 + 0 - 15750000 + 0$$

$$c \text{ numerator} = 57750000$$

Calculate a

$$a = \frac{a \text{ numerator}}{\Delta}$$

$$a = \frac{550}{\Delta}$$

$$-41250000$$

$$a = -1.3333333333333333E-5$$

Calculate b

$$b = \frac{b \text{ numerator}}{\Delta}$$

$$b = \frac{-467500}{-41250000}$$

$$b = 0.0113333333333333$$

Calculate c

$$c = \frac{c \text{ numerator}}{\Delta}$$

$$c = \frac{57750000}{-41250000}$$

$$c = -1.4$$

Build our equation:

Our equation is represented by $ax^2 + bx + c$

$$-1.3333333333333333E-5x^2 +$$

$$0.0113333333333333x - 1.4$$