



Now take the *first forward differences* by subtracting each y-value from the next y-value (eg, 7-4=3), and take *second forward differences* by subtracting first differences:

<u>CUTS</u> (X)	1	2	3	4	5
<u>PIECES</u> (Y)	2	4	7	11	16
FIRST DIFFERENCES	_____	_____ <u>3</u> _____	_____	_____	
SECOND DIFFERENCES		_____	_____	_____	

A function that has *constant second forward differences* for equally spaced values of X is a **quadratic polynomial** in X. So we should be able to find values of a, b and c that make

$$Y = a X^2 + b X + c$$

fit our data *exactly*. Use the TI-82/3 to find the needed values of a, b and c .

$$Y = \frac{\quad}{(a)} X^2 + \frac{\quad}{(b)} X + \frac{\quad}{(c)} .$$

Try your function on some other points of our data set:

<u>X</u>	cuts yield	<u>Y</u>	pieces
<u>1</u>	cut yields	<u>2</u>	pieces
<u>2</u>	cuts yield	<u>4</u>	pieces
<u>3</u>	cuts yield	_____	pieces
<u>5</u>	cuts yield	_____	pieces
<u>7</u>	cuts yield	_____	pieces
<u>10</u>	cuts yield	_____	pieces

Extension: Set up an equation to solve the following: If you found that a sandwich had been cut into 46 pieces, how many cleaver cuts were made (minimally)? Show your equation and solution in the space above ↗ \_\_\_\_\_

Optional research question: The correlation coefficient is a measure of *linearity*. Why do nonlinear fits (the exponential and power fits) have correlation coefficients?