Intuition: Variance Vs. Standard Deviation:

Why is the numerator squared?:

1. Squaring makes each term positive so the sum will not be zero.

x_i		value	$(x_i - \mu)^2$		result	total
x_1	=	1	$(1-3)^2$	=	4	
x_2	=	2	$(2-3)^2$	=	1	
x_3	=	3	$(3-3)^2$	=	0	
x_4	=	4	$(4-3)^2$	=	1	
x_5	=	5	$(5-3)^2$	=	4	**10**

Vs.

x_i		value	$x_i - \mu$		result	total
x_1	=	1	$1-3$	=	-2	
x_2	=	2	$2-3$	=	-1	
x_3	=	3	$3-3$	=	0	
x_4	=	4	$4-3$	=	1	
x_5	=	5	$5-3$	=	2	**0**

Table 1: Comparison of Results

2. Squaring emphasizes larger differences. Which could be good or bad depending on things like outliers. Also when converting standard deviation taking the square root of what was squared converts back to the original unit.

   TODO: add more