

**SOLUTION TO THE QUESTION FOR MATH 343 FOR  
THE LECTURE OF 23 APRIL**

To do this quickly, you might want a calculator.

This is a slight modification of the problem as announced on Wednesday.

**Problem 1.** The probability mass function for the random variable  $X$  is given as follows:

$x$	$f_X(x)$	$(x - \mu)^2$	$(x - \mu)^2 f_X(x)$
0	$\frac{27}{64}$		
4	$\frac{27}{64}$		
8	$\frac{9}{64}$		
12	$\frac{1}{64}$		

Fill in the blank spaces in the table, and use this to find the variance and standard deviation.

To save work, I am telling you ahead of time that  $E(X) = 3$ .

*Solution.* Since  $E(X) = \mu$ , the table is filled in as follows:

$x$	$f_X(x)$	$(x - \mu)^2$	$(x - \mu)^2 f_X(x)$
0	$\frac{27}{64}$	$(-3)^2 = 9$	$\frac{243}{64}$
4	$\frac{27}{64}$	$(4 - 3)^2 = 1$	$\frac{27}{64}$
8	$\frac{9}{64}$	$(8 - 3)^2 = 25$	$\frac{225}{64}$
12	$\frac{1}{64}$	$(12 - 3)^2 = 81$	$\frac{81}{64}$

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The variance is the sum of the four numbers in the last column, so

$$\text{Var}(X) = \frac{243}{64} + \frac{27}{64} + \frac{225}{64} + \frac{81}{64} = \frac{576}{64} = 9.$$

Therefore  $\sigma_X = \sqrt{\text{Var}(X)} = 3$ .

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