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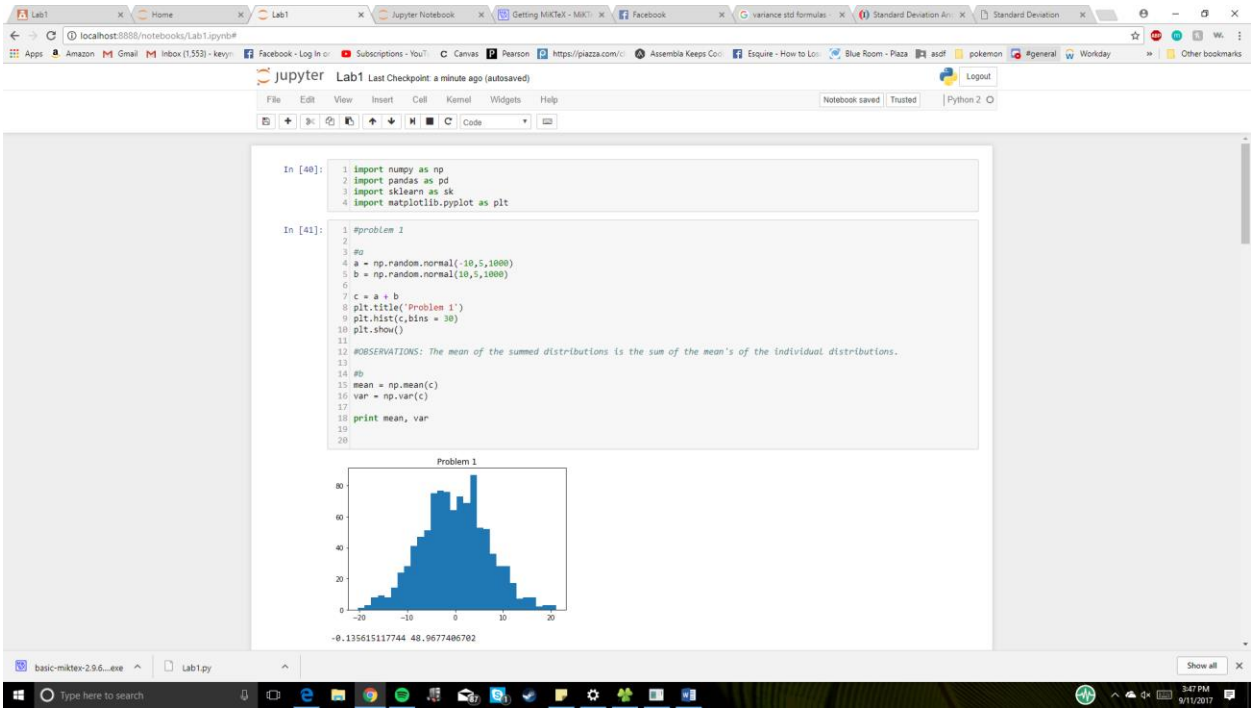
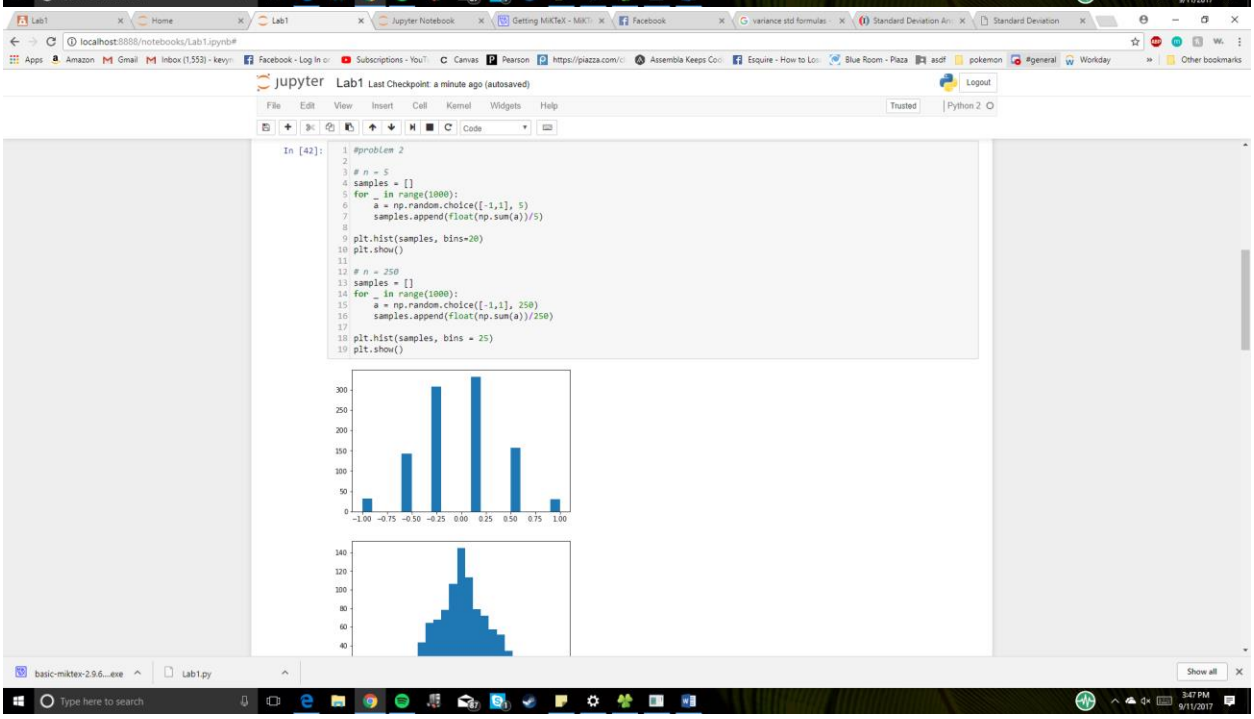
Lab1





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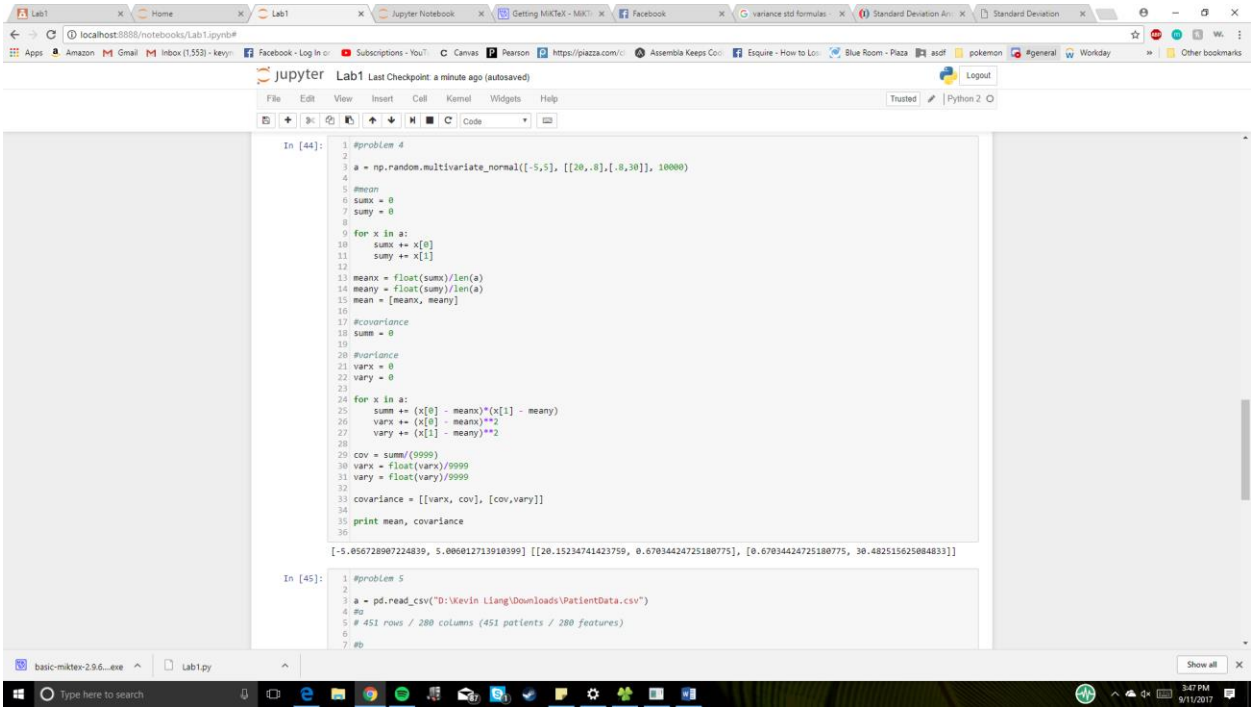

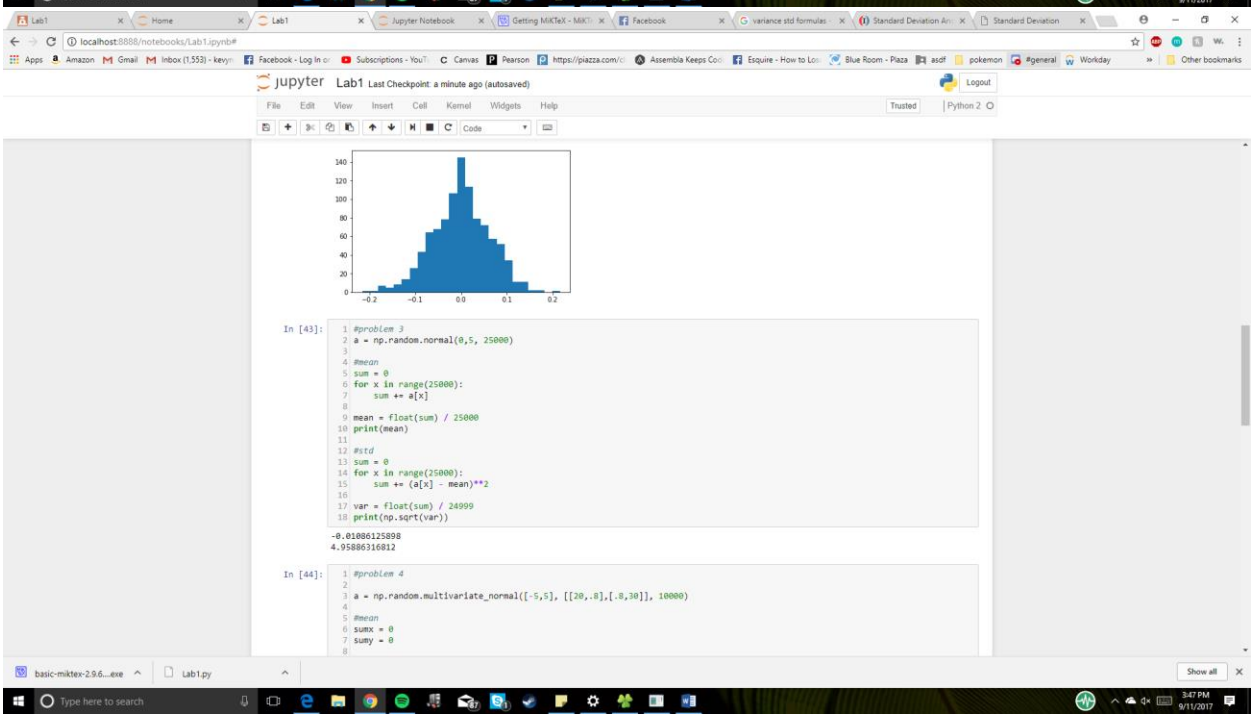

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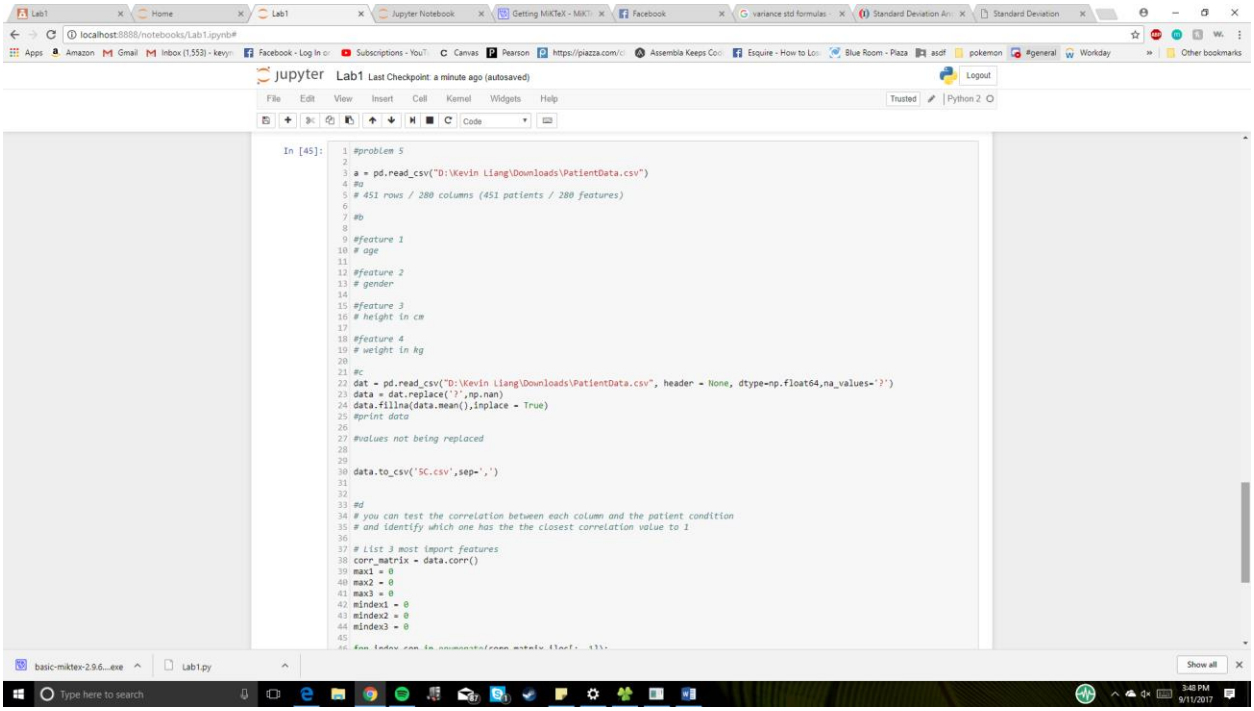

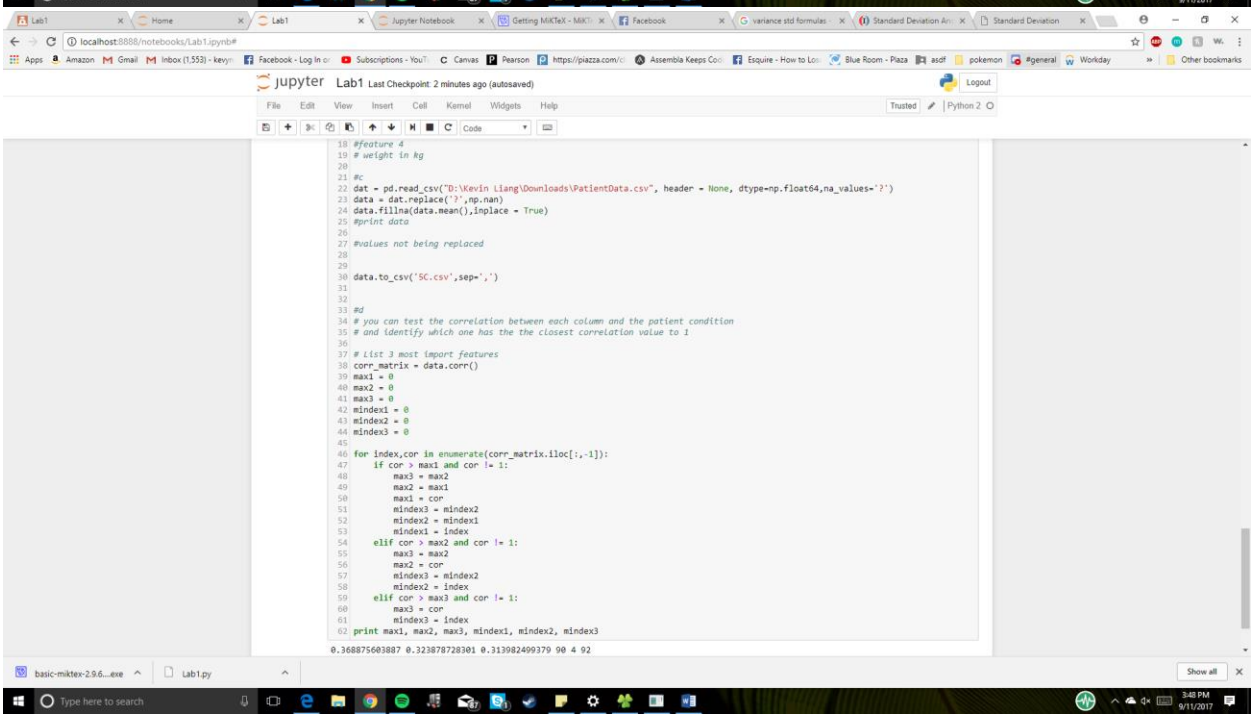

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1. a). $\frac{1}{4} + \frac{1}{3} = \boxed{\frac{7}{12}}$

b). $\frac{1}{3} / \frac{3}{6} = \boxed{\frac{2}{3}}$

c). $Var(X) = E[X^2] - E[X]^2 = 1(\frac{1}{4} + \frac{1}{3}) - (1(\frac{1}{4} + \frac{1}{3}))^2$

$= \frac{7}{12} - \frac{49}{144} = \boxed{\frac{35}{144}}$

d). $Var(X|Y=1) = E[X^2|Y=1] - (E[X|Y=1])^2$

$= \frac{2}{3} - \frac{4}{9} = \boxed{\frac{2}{9}}$

e). $E[X^3 + Y^2 + 3Y^7 | Y=1] = 3 \cdot \frac{1}{3} + 5 \cdot \frac{2}{3} = \boxed{\frac{13}{3}}$

2. $V_1 = [1, 1, 1]$, $V_2 = [1, 0, 0]$

$V_1 \times V_2 = [0, 1, -1]$

$P_1 = proj_N P_1 = \frac{P_1 \cdot N}{N \cdot N} = \frac{0+3-3}{1+1}[0,1,1] = 0$

$proj_\Pi P_1 = [3, 3, 3]$

$P_2 = proj_N P_2 = \frac{2-3}{2}[0, 1, -1] = [0, -\frac{1}{2}, \frac{1}{2}]$

$proj_\Pi P_2 = P_2 - proj_N P_2 = [1, 2, 3] - [0, -\frac{1}{2}, \frac{1}{2}] = [1, \frac{5}{2}, \frac{5}{2}]$

$P_3 = proj_N P_3 = \frac{1}{2}[0, 1, -1] = [0, -\frac{1}{2}, \frac{1}{2}]$

$proj_\Pi P_3 = P_3 - proj_N P_3 = [0, 0, 1] - [0, -\frac{1}{2}, \frac{1}{2}] = [0, \frac{1}{2}, \frac{1}{2}]$

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