# M 362K Pre-Class Work for 2/5

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**Question**: A group of students are volunteering either in a soup kitchen or a library. Among the students, 40% are in middle school and 60% are in high school. In a group of volunteers in the library, 20% are middle school students. What is the probability that a selected volunteer is a middle school student given that the student is volunteering in a library?

**Solution**: From the question we can know $Pr(middle) = 0.4$, $Pr(high) = 0.6$ and $Pr(library|middle) = 0.2$

$\therefore Pr(library|high) = 1 - Pr(library|middle) = 1 - 0.2 = 0.8$

Using Bayes' rule, we can get:

$Pr(middle|library) = \frac{Pr(library|middle)*Pr(middle)}{Pr(library|middle)*Pr(middle)+Pr(library|high)*Pr(high)} = \frac{0.2*0.4}{0.2*0.4+0.8*0.6} = \frac{1}{7} \approx 0.14$