HW #1 Part 3. Nan Tang

Q1: I think normal distribution model seems to be a widely used model, but so far, I've learned only two ways of applying normal distribution model. The first thing I learned is using normal distribution to approximate binomial value by C.L.T. And another use of normal is the distribution of sample mean. I'm wondering if there are wider usage of such distribution in statistical models?

Q2: I know that Student's t-test is utilized in the case when sample size less than 30 and the t-distribution is a little bit different from standard distribution. And I was also told that to reduce the bias of small sample size, t-distribution has a degree of freedom of $(n-1)$, meanwhile, the standard deviation in a t-distribution is written as $\sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})}{n-1}}$. I'm confused on whether the $(n-1)$ degree of freedom and the $(n-1)$ denominator in the standard deviation have the constant (-1), since the effect of (-1) on standard deviation of sample distribution are quite different between sample with size 20 and sample with size 10.