The binomial(n,p) distribution has

$$P(X=k)=\binom{n}{k}p^k(1-p)^{n-k},\quad E(X)=\mu=np,\quad SD(X)=\sigma=\sqrt{np(1-p)}$$

If X has the normal distribution with parameters μ and σ and Z is a standard normal random variable, then

$$P(a\leq X\leq b)=P(\frac{a-\mu}{\sigma}\leq Z\leq \frac{b-\mu}{\sigma}).$$

The latter is answered with the help of a table.

The central limit theorem describes the sampling distribution of $\bar{x}$. It has $E(\bar{x})=\mu$, $\mathsf{SD}(\bar{x})=\sigma/\sqrt{n}$, and for large n an approximately normal distribution (in all the cases we consider).

Assuming $\widehat{p}=X/n$ is found from a random sample from a population with proportion p of success, a $(1-\alpha)\cdot 100\%$ confidence interval for p based on $\hat{p}$ is given by

$$\hat{p}-z^*\mathsf{SE}(\widehat{p})<p<\hat{p}+z^*\mathsf{SE}(\widehat{p}).$$

The standard error is given by $\mathsf{SE}(\widehat{p})=\sqrt{\widehat{p}(1-\widehat{p})/n}$. The value of z^* comes from the relationship $P(-z^*\leq Z\leq z^*)=1-\alpha$, and can be found one of two ways described in class. The value $z^*\mathsf{SE}(\widehat{p})$ is known as the margin of error.

Assuming $\bar{x}$ is found from a random sample of size n from a normal population with unknown mean μ, a $(1-\alpha)\cdot 100\%$ confidence interval for μ based on $\bar{x}$ is given by

$$\bar{x}-t^*\mathsf{SE}(\bar{x})<\mu<\bar{x}+t^*\mathsf{SE}(\bar{x}).$$

The standard error is given by $\mathsf{SE}(\bar{x})=s/\sqrt{n}$. The value t^* is related to α by the relationship $\alpha/2=P(T_{n-1}>t^*)$ where T_{n-1} has a t-distribution with $n-1$ degrees of freedom. The value $t^*\mathsf{SE}(\bar{x})$ is known as the margin of error.