PROBABILITY MODELS ASSUME $X \sim N(\mu, \sigma^2)$

STATISTIC	EXPECTATION	VARIANCE	DISTRIBUTION
		ASSUME X_i's INDEPENDENT	
$\bar{X} = \frac{1}{N}\sum_{i=1}^{N} X_i$	$E(\bar{X}) = E(X) = \mu$	$V(\bar{X}) = \frac{1}{N^2} V(\sum_{i=1}^{N} X_i) = \frac{1}{N^2}\sum_{i=1}^{N} V(X_i)$ $= \frac{1}{N^2} N V(X) = \frac{1}{N} V(X) = \frac{1}{N}\sigma^2$	$N(E(X), \frac{1}{N}V(X))$ $N(\mu, \frac{1}{N}\sigma^2)$
$S^2 = \frac{\sum_{i=1}^{N} (X_i - \bar{X})^2}{N-1}$	$E(S^2) = V(X) = \sigma^2$	$V(S^2) = \frac{2N}{(N-1)^2} V(X)^2$ $= \frac{2N(\sigma^2)^2}{(N-1)^2}$	$\frac{V(X)}{N-1}\,\chi^2_{(N)}$ $\frac{1}{N-1}\sigma^2\,\chi^2_{(N)}$
$\frac{\bar{X} - \mu}{\sqrt{S^2/N}}$	$E(X) - \mu = \mu - \mu = 0$	—	$\frac{\frac{\bar{X}-\mu}{\sigma/\sqrt{N}}}{\sqrt{S^2/\sigma^2}} \sim t_{(N-1)}$

ETC. GENERAL STRATEGY: FIND A STATISTIC WHICH ESTIMATES/TESTS WHAT YOU WANT AND FIND ITS PROBABILITY DISTRIBUTION (NON-TRIVIAL TASKS) - ONCE KNOWN, COMPUTE STATISTIC, LOOK UP PROBABILITY, (FIND CONFIDENCE INTERVAL)