Set 27: More on Hypothesis testing

Errors in testing:

	Parameter Space	
Decision	H_0 **true**	H_1 **true**
Reject H_0	**Type I Error**	
Do not reject H_0		**Type II Error**

Discussion questions:

- **what is a good test?**
- **can we have a perfect test?**

Example: We examine Type I error and Type II error in the earlier example where a defendent is accused of a crime in a court of law.

Probabilities associated with errors in testing:

	Parameter Space	
Decision	H_0 **true**	H_1 **true**
Reject H_0	α	$1-\beta$
Do not reject H_0		β

Discussion points:

- α **is the *significance level* of a test**
- **we typically fix** α
- $1-\beta$ **is referred to as the *power* of a test**
- **we want the power to be large**
- α, β **are test properties**
- **note that in our examples,** H_0 **is *simple***
- **note that in our examples,** H_1 **is *composite***

Example: We return to the one sample problem where $X_1, \ldots, X_n$ are iid, $\sigma = 1.8$, $\alpha = 0.05$ and $n = 100$. We are interested in testing $\mathrm{H}_0 : \mu = 3$ versus $\mathrm{H}_1 : \mu > 3$.

(a) Find the *critical region* (rejection region).

(b) Calculate the power at $\mu = 3.2$.

(c) Calculate the power at $\mu = 3.5$.

(d) What happens in (b) when $n = 100 \to 400$?

This example is answered in the book. Please read over the solution.