One way to show

sufficiency is using the definition,

which is what we just did with the two examples,

that was not particularly fun.

We can also show sufficiency using a much nicer method.

This is I guess the second key out of today's class.

We can also show sufficiency by using the Neyman-Fisher.

Let me use a different colour,

it means it's fairly important.

We're going to use the Neyman-Fisher Factorisation Criterion.

Instead of applying the definition by computing this distribution of my sample,

given my sufficient statistic,

we can apply Neyman-Fisher Factorisation Criterion.

Essentially, it fires as this.

If my run is variables X_i have some density function which depend on

Theta and then we want to see a sufficient statistic T of x,

so it's simply evaluated at my sample.

This statistic is efficient for

Theta if and only if.

This implies that if I have this factorisation,

so L X Theta is just my likelihood.

So what I mean my likelihood is the joint density of my observations, X_1 to X_n.

We'll say this likelihood function of one.

When we have our ID, it's pretty much just a product of my individual density functions.

Here when my joint density of

my observations can be written as the following factorisation.

I take some function g of my sufficient statistic and my parameter Theta.

We have one function, g,

which depends on my sufficient statistic,

my primary Theta, multiplied by some function h,

which depends only on my data.

H and g are positive functions here, it's sufficient.

We have this particular factorisation,

it means that T of x is sufficient for Theta.

Instead of applying the definition,

all we have to do is compute the likelihood,

this thing here, show that it can be factored into this form.

One function that depends on my sufficient statistic and also my parameter,

Theta, multiplied by some function that only depends on my data x.

If it has this factorisation,

then it means that T of x is sufficient for Theta.

Again, that's going to provide much simpler and directly

applying the definition as we did in that first question