We can write joint density as

For Gaussian distribution, we have that:

…

We can write this as

We can write this succinctly as

Notice that

Implies that

As a result

Notice that

Which implies that

Let’s write a small A to see how this works:

#-----------------------------------------

Recall that if

Then:

Because we will condition only on the parents of, we can write this as

Because the mean is zero, this further simplifies to:

Recall that we have defined this as:

More generally